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ILLINOIS DAIRY DIGEST

...AND OF LINCOLN DAIRYMEN

Volume 9, I... February, 1980

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ILLINOIS DAIRY DIGEST
FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 9, Number 1 February, 1980

Using Prostaglandins in Dairy Heifers

In November, 1979, the Food and Drug Administration approved the use of prostaglandins in controlled breeding programs for beef cows and heifers and for dairy heifers. What does this mean for dairymen?

For some, very little. Dairymen who are already practicing heat detection and artificial insemination of heifers, as well as cows, probably will benefit very little from using prostaglandins. The principal advantage for such dairymen would be to concentrate the breeding and calving into a shorter period of time for a group of heifers.

For other dairymen who find it difficult to observe heifers frequently for heat or who are using a bull for breeding, there may be a definite advantage in using prostaglandins; also, they can enhance the use of artificial insemination. Prostaglandin will not overcome low fertility or poor management practices and is not a cure for reproductive problems.

Prostaglandin is a natural chemical found in most animals. There are many natural prostaglandins. They have a variety of functions in the body. The prostaglandin of importance for controlled breeding is prostaglandin $F_2\alpha$ ($PGF_2\alpha$). When prostaglandin is administered to a heifer or cow with a functional *corpus luteum* (yellow body) on the ovary, the *corpus luteum* will regress rapidly which, in turn, results in a rapid decrease in the hormone, progesterone. That decrease in progesterone allows the development of ovarian follicles with an increase in estrogen, estrus, or heat--followed by ovulation, or shedding, of the egg.

$PGF_2\alpha$ is only effective on a functional *corpus luteum*. Thus, the animals to be treated must be having normal estrous cycles. This can be determined by recording heats for the animals or by ovarian palpation via the rectum to determine the presence of a *corpus luteum*. Since the effect of $PGF_2\alpha$ is only on a functional *corpus luteum*, this means that the developing *corpus luteum* (first 4 to 5 days following heat) and the normal regressing *corpus luteum* (last 4 to 5 days of the estrous cycle) will not respond to the prostaglandin. During the estrous cycle, the effective time for treatment with $PGF_2\alpha$ is between day 6 and day 17 of the estrous cycle. Most animals will then show the signs of heat within 2 to 5 days following the injection of $PGF_2\alpha$.

Basically, two planned breeding programs can be followed with prostaglandin. Each use the injections differently.

The first program is to inject the heifers with $PGF_2\alpha$ and watch for heat during the next 2 to 5 days. The animals that show heat can be inseminated, following the usual recommendations. The heifers that are not inseminated would receive a second injection 11 days after the first one, would be observed, and then inseminated as described following the first injection.

The heifers that are not in heat fol-

lowing the second injection could be inseminated at 76 to 80 hours following the second injection.

The second program is to inject all heifers you want to breed, then follow 11 days later with a second injection of all the heifers. With this approach, all cycling heifers should respond to the second injection; and insemination can be performed either on those heifers showing heat or at a specified time (76 to 80 hours after the second injection), or a combination of the two. Although the recommendation calls for a delay of about 80 hours before making the timed insemination, the recommendation is based primarily on the response for cows. Some research results on beef heifers suggest that 80 hours may be too long and that the timed insemination of heifers should be sooner. Until this matter is settled by further research on dairy heifers, the best procedure would be to observe closely for heat after the prostaglandin injection and inseminate in relation to the observed heat. Animals that are not inseminated or that do not conceive will have normal estrous cycles of about 21 days following the prostaglandin treatment and can be handled the same as in a normal reproduction program.

Prostaglandin should only be used with healthy, well-fed, well-managed, cycling dairy heifers that would be inseminated following observed heat. If you want to use prostaglandin, consult your veterinarian. (J.R. Lodge, Dairy Scientist)

Dairy Calendar of Events

INDIANA-ILLINOIS DAIRY MANAGEMENT CLINIC. This event is scheduled for March 6 and 7 at LaPorte, Indiana. A fast-moving program starts at 12:30 on March 6 featuring herd programs for the post partum cow, with views by veterinarians and dairymen plus available reproductive records and computer tools. Other topics will include transient voltage, buffers, brewers' grain, and selenium. Optional farm visits and tours are available on the second afternoon.

ENERGY FROM AGRICULTURE/FUEL FOR AGRICULTURE, a statewide Extension Service program. Alternate energy resources available to Illinois agriculture will be discussed, plus an update on energy, the production and utilization of ethyl alcohol, livestock residue feeding, and the economic aspects. The program will be held on March 5 at the Illini Union Building in Urbana.

FOURTH INTERNATIONAL SYMPOSIUM ON LIVESTOCK WASTE, APRIL 15-17, CIVIC CENTER, AMARILLO, TEXAS. The meeting is planned for people interested in and involved with the application of livestock waste-management technology. For details, contact the American Society of Agricultural Engineers, Dept. ISLW, Box 410, St. Joseph, Michigan 49085.

ANNUAL MEETING OF THE DAIRY HERD IMPROVEMENT ASSOCIATION OF ILLINOIS, INC. This one will be held February 23 at Bob Johnson's Restaurant in Bloomington starting at 10:30.

THIRTY-SECOND ANNUAL PDCA-SPONSORED JUNIOR CALF SALE AND MEETING, APRIL 11 AND 12, on the Urbana-Champaign Campus of the University of Illinois.

For more details and registration forms, contact: Dairy Extension Office, 315 Animal Sciences Lab., Urbana, IL 61801.

Use of Distillers' and Brewers' Byproducts as Freed for Dairy Cows

Byproducts of brewery and distillery operations represent a significant source of feed for livestock (1.5 million tons per year). If the gasohol-producing industries decided to ferment the whole corn grain, a considerable amount of additional fermented byproduct would be available for livestock feed. Presently, the leader in alcohol production for use in gasohol (Archer-Daniels-Midland of

Decatur) separates the corn kernel into its components and ferments only the starch and sugars. This process leaves no fermented byproduct except the yeast, but does provide cattle feed in the form of corn gluten.

Because of the high energy costs involved in drying distillers' and brewers' byproducts, these feeds are appearing on the market as wet feeds. Considerable interest has been expressed by dairymen about the feeding value of wet brewers' grains for lactating dairy cows.

On a dry-matter basis, brewers' and distillers' byproducts are comparable in their chemical makeup, containing about 25 to 30 percent crude protein, 5 to 7 percent crude fat, 11 to 14 percent crude fiber, and 2 to 5 percent minerals or ash. The wet products as they come from the fermentation plant contain a high percentage of water (80 to 85 percent for brewers' grains and 90 to 95 percent for distillers' grains with solubles).

The feeding value of dried brewers' grains and dried distillers' grains with solubles is equivalent to conventional protein supplements, such as soybean oil meal, for lactating dairy cows. The distilling byproducts may

[illegible] commonly used pro-

son, the wet byproducts should not be included in the ration for cows pro-

ducing more than 65 to 70 pounds of milk per day. Those cows are already experiencing enough difficulty in eating sufficient amounts of dry matter to meet their needs without handicapping them by incorporating a very high-mositure feed into their ration.

Aside from the basic consideration of cost for the byproduct per unit of protein, due concern should be given to the availability of the byproduct and its consistency in terms of nutrient content as well as the ease with which the feed can be incorporated into your program. For example, if the wet product is to be used, facilities must be available for storing, mixing, and feeding. A loss of the feeding value could occur if the wet feed is not placed in sound structures that prevent seepage. (C.L. Davis, Dairy Scientist and M.F. Hutjens, Extension Dairyman).

Ed Jaster Joins Dairy Staff

On January 1, Ed Jaster joined the staff of Department of Dairy Science. His research interests are in dairy cattle management, specializing in reproductive efficiency, mastitis, environment stress, and fat mobilization in dry and lactating cows. His teaching responsibilities include courses on dairy management and

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The feeding value of dried brewers' grains and dried distillers' grains with solubles is equivalent to conventional protein supplements, such as soybean oil meal, for lactating dairy cows. The distilling byproducts may be substituted for commonly used protein supplements if the price is favorable on the basis of cost per unit of protein. Best results are obtained when such products do not exceed 30 percent of the total dry matter in the ration.

Wet brewers' and distillers' byproducts have equal or even superior feeding value for cows at an average milk-production level, compared to the same products fed in a dry form. Cows fed the wet products (at a level to supply 20 percent of the total dry-matter content) will consume less total dry matter than when given comparable amounts of the dried products. For that reason, the wet byproducts should not be included in the ration for cows producing more than 65 to 70 pounds of milk per day. Those cows are already experiencing enough difficulty in eating sufficient amounts of dry matter to meet their needs without handicapping them by incorporating a very high-mositure feed into their ration.

Aside from the basic consideration of cost for the byproduct per unit of protein, due concern should be given to the availability of the byproduct and its consistency in terms of nutrient content as well as the ease with which the feed can be incorporated into your program. For example, if the wet product is to be used, facilities must be available for storing, mixing, and feeding. A loss of the feeding value could occur if the wet feed is not placed in sound structures that prevent seepage. (C.L. Davis, Dairy Scientist and M.F. Hutjens, Extension Dairyman).

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On January 1, Ed Jaster joined the staff of Department of Dairy Science. His research interests are in dairy cattle management, specializing in reproductive efficiency, mastitis, environment stress, and fat mobilization in dry and lactating cows. His teaching responsibilities include courses on dairy management and health.

Dr. Jaster, a native of Belvidere in northern Illinois, grew up on a dairy farm in Wisconsin, taught vo-ag for 3 years in Thorp, Wisconsin, and completed his doctorate last fall at the University of Arizona. He and his wife Paula have a son, Bryan.

Dairy producers will be meeting Ed soon at various dairy fuctions. We welcome Dr. Jaster to the University of Illinois and the Department of Dairy Science.

DID YOU KNOW the value of milk sold by dairy producers in the United States in 1978 was worth $13 billon dollars?

New Pregnancy Test Available Through DHIA

DHIA of Illinois is now offering pregnancy detection, using a test now available through Dairy Lab Services (a subsidiary owned by DHIA of Illinois, Inc. and the Iowa State DHIA). A test is available only from DHI supervisors and is based on the level of the hormone progesterone being produced by the cow.

The dairyman takes a sample of the strippings (last milk) on the day 24 after the cow was bred and mails the sample to a lab at Cornell University. If the lab finds the level of progesterone in the sample is low, the dairyman can be 98 to 99 percent sure the cow is not pregnant. If the progesterone level is high, the chances are that she is pregnant. But due to embryonic mortality, the certainty about this is only 75 to 80 percent that she will be pregnant 90 days after breeding.

The test can be purchased in the form of a kit for $15. The kit consists of 5 sample tubes, mailing envelopes, forms, and instructions. The dairyman simply samples the cow and mails the sample along with a form to Cornell. The lab there will send a reply within a week, showing whether the cow is pregnant or open.

The advantage of the progesterone pregnancy test is the early detection of open cows. The results will be available before the next possible heat period, so the cow can be watched more closely to catch her in heat so she can be bred again.

The economic impact of poor reproductive performance is substantial. The estimated loss per cow in a herd averaging 15,000 pounds of milk is approximately $1.80 per day for each day that the calving interval exceeds 365 days. Using these figures, the yearly loss in a 50-cow herd with a calving interval of 13.3 months would amount to $3,500. By comparison, the cost of using the progesterone test on a 50-cow herd would be $150 a year.

For further information on the progesterone pregnancy test, see the December, 1979 *Illinois Dairy Digest* or contact the Dairy Extension Office, 315 Animal Sciences Lab., Urbana, IL 61801. (G.W. Harpestad, Extension Dairyman)

M.F. Hutjens G.W. Harpestad,
R.V. Johnson Extension Dairymen

Cooperative Extension Service
United States Department of Agriculture
University of Illinois
At Urbana-Champaign
Urbana, Illinois 61801

ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 9, Number 2 *April, 1980*

Beta Carotene and Fertility of Dairy Cattle

Research reports have appeared recently on beta carotene and its influence on reproductive performance. Beta carotene is a fat-soluble nutrient that is converted into vitamin A. It is a yellowish-orange pigment associated with milk fat when cows receive green forage. Researchers in Europe and Canada have reported interesting results.

Influence of Beta Carotene on Bovine Fertility (30 mg./100 kg. of body weight)

	Control	Supplemental
Number of animals	20	19
Blood plasma levels of beta carotene (mcg./100 ml.)	203	918
Heat intensity (1 = low, (4 = high)	1.9	2.7
Cystic ovaries (%)	40	5
Number of inseminations that produced pregnancy	2.00	1.42

Ovulation time was shorter in the supplemented cows which would influence the time to breeding and fertility. Vitamin A would not take over this role or correct a deficiency. The 1978 NRC suggests 19 milligrams of carotene per 220 pounds of body weight for successful reproduction.

Practically, feeding 3 to 5 pounds of green leafy forage should provide an adequate intake of carotene. However, poor-quality forage, low forage intake, heat damage, extended storage, rain damage, and heavy corn silage with low-carotene grain mixtures could be limiting. Current research is limited to small numbers of animals, but warrants further attention and effort. The University of Illinois dairy science department is currently collecting information on feed and blood carotene levels. For more complete research information, review *Feedstuffs* (October 22, 1979, page 36) and the *Holstein-Friesian Journal*, October, 1979, page 103. (M.F. Hutjens, Extension Dairyman)

Resistance to Mastitis with the Plastic Loop

The plastic loop, a new and innovative device, when inserted into each teat of a cow's udder may prevent mastitis. Mastitis is recognized as a costly disease afflicting dairy cows. Reports in a 1976 survey estimated total losses from mastitis in the United States at $1.294 billion annually.

When inside the udder, the loop offers the dairymen a possible management tool for reducing mastitis. The loop stimulates the cow's natural disease-fighting mechanism. The loop is an intramammary device made of polyethylene plastic approximately 5 inches long (130 millimeters) and 1/8 of an inch in diameter (2 millimeters). The device takes a circular shape when inserted into the milk cistern of each quarter. The

Table 8. Timothy

Northern Illinois	Central Illinois	Southern Illinois
Clair	Clair	Clair
Climax	Itasca	Climax
Itasca	Pronto	Timfor
Timfor	Timfor	
Toro	Toro	
	Verdant	

If any our subscribers have not received all issues of the Dairy Digest newsletter for 1980, they can write to Leann Topol, Ag. Newsletter Service, 330 Mumford Hall, Urbana, IL 61801 and request the missing issues.

M. F. Hutjens, G. W. Harpestad, R. V. Johnson Extension Dairymen

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 9, Number 3 *June, 1980*

New Antibiotic Screening Test

On July 1, the Illinois Department of Public Health, Division of Milk Control, will implement the enforcement of the 1978 Recommendations to the Grade A Pasteurized Milk Ordinance. One major change will be that all Grade A pasteurized milk, milk products, and commingled raw milk must be tested for the presence of penicillin and other antibiotic residues. The dairy industry laboratories will still have the option of using the Bacillus-Subtilis Test for individual raw milk samples from Grade A producers. The State of Illinois official laboratories used for testing Grade A pasteurized milk, milk products, and commingled raw milk samples will be required to use the Sarcina-Lutea Cylinder Plate method, or the Bacillus Stearothermophilus Test procedure approved by the Association of Official Analytical Chemists. Both tests are more sensitive to penicillin and other antibiotic residues in milk than current tests.

The problem of antibiotics in milk is associated with their use in the treatment of mastitis and other diseases in dairy cows. Failure to withhold milk from the market for enough time after treating cows may result in the presence of antibiotics in milk. Such milk is undesirable for two reasons: (1) it comes from unhealthy cows; (2) the milk is adulterated.

The allergenic properties of certain antibiotics (penicillin) in common use make their presence in milk potentially hazardous to consumers. Also, substantial losses of byproducts may be sustained by the dairy industry because of the inhibitory effects of antibiotics on the culturing process. Therefore, after July 1, 1980, all Grade A raw milk producers within the State of Illinois will have to be extremely cautious about these types of antibiotics. They will have to be knowledgeable of the length of time it takes for the antibiotic residue to be eliminated from a treated dairy cow's system so that the cow's milk will not be introduced into the supply of milk available on the market.

The inclusion of antibiotic-contaminated raw milk into a Grade A raw milk supply could prove to be very costly to a Grade A dairyman after July 1. The services of the Division of Milk Control are available to milk producers who need assistance. (L.W. Schultz, Assistant Chief, Division of Milk Control, Illinois Department of Public Health)

Niacin, Is It for the High-Producing Cow?

Niacin, or nicotinic acid, is a B-complex vitamin required by livestock for enzyme systems that control body metabolism and energy utilization. Historically, most research indicated that rumen microbes could synthesize all the niacin that dairy cattle needed. Niacin is also found in common feed ingredients. Recent research at Wisconsin, Kansas, and Michigan indicates that milk production response may occur in early lactation. Increased milk

production (as much as 6 pounds a day) in the first 49 days of lactation has been reported along with higher intakes of dry matter.

Effect of Niacin and Protein Source on Milk Production in Early Lactation, Kansas State University

Protein Source	Protein Level (%)	Niacin	FCM[a] (lb./ day)	FCM[a] (lb./49 days
Soybean	15.8	With	65.5	3,209
Soybean	15.8	Without	58.6	2,872
Urea	16.5	With	54.2	2,655
Urea	16.5	Without	59.4	2,910

[a] 4% fat-corrected milk

The level of added niacin was about 6 grams per cow per day at a cost of 6 cents. The cost-benefit ratio in the initial 49 days of lactation was 12.5 ($12.50 worth of additional milk for each $1 spent on niacin). The economic value may decline if niacin is fed over the entire lactation period since the maximum response seems to occur in early lactation.

Feedlot responses with beef cattle have also been observed, with an improvement of 10 percent in energy efficiency for gain. The results also indicated that adding niacin may facilitate the adaption by cattle to urea diets and suggested a positive effect on protein use and growth.

The mode of action has not been clearly determined. Several possibilities have been suggested.

1. Making better use of mobilized body fats.
2. Increasing the availability of co-enzyme precusors.
3. Mediating carbohydrate metabolism.
4. Stimulating rumen protein synthesis, the production of propionic acid, (a source of blood sugar), or both.

Additional research on niacin and its role in high-producing dairy cows is underway. The use of niacin will depend on the results; but as cows produce more milk and are placed under greater nutritional stress, the possibility of B-vitamin inadequacies could cause a new look at nutrient requirements. (M.F. Hutjens, Extension Dairyman)

Livestock Waste Management

Recently, several new surveillance persons have been assigned to work full time on livestock waste problems by the Illinois Environmental Protection Agency and its Division of Water Pollution Control. Presently, 5 such people are covering the entire state, which seems to indicate additional activity by the agency. The major concern is investigating complaints made against livestock operations. A list of the surveillance staff follows, showing the region(s) in which they work. Feel free to contact these people with questions and concerns.

LIVESTOCK WASTE SURVEILLANCE PERSONNEL

Regions 1 and 2
Virginia Matlavish
4302 North Main Street
Rockford, IL 61103
Telephone: (815) 987-7755

Regions 3 and 4A
Eric Ackerman
5415 North University
Peoria, IL 61614
Telephone: (309) 691-2200 Ext. 202

Regions 4B and 5
Ross Manning
4500 South 6th Street
Springfield, IL 62706
Telephone: (217) 786-6892

Region 6
Kenneth F. Hammer
117 West Main Street
Collinsville, IL 62959
Telephone: (618) 345-6220

Region 7
Chuck Hummel
2209 West Main Street
Marion, IL 62959
Telephone: (618) 997-4371

For general information regarding feedlot regulations contact A.G. Taylor, IEPA, 2200 Churchill Road, Springfield, IL 62706, telephone (217) 782-9871. (A.J. Muehling, Extension Agricultural Engineer)

EATA: A Genetic Evaluation of Cows

Estimated Average Transmitting Ability (EATA) is a reliable estimate of the cow's ability to transmit milk and fat production to her offspring. The estimate is based on her sire's proof (production records of her paternal sisters), her own production records, and the records of her "cow family"--consisting of her dam, daughters, and maternal sisters.

In calculating the EATA, the most weight or emphasis is given to the records of the cow and her paternal sisters. Including records from her "cow family" increases the accuracy of the evaluation by 5 to 7 percent.

EATA's are printed on the Pedigree and Evaluation (DHIA-203) and on the Herd Ranking and Summary (DHIA-204) reports prepared for all of the herds enrolled in the DHI production record program. Individual herd averages of the EATA for milk and fat were printed in the Herd Genetic Evaluation section of the DHIA-204 report issued for each herd. Averages for the top 25 percent of herds of the same breed in the 9-state area served by Mid-States Dairy Records Processing Center were also shown in that section of the report.

A listing of the average EATA for all Illinois herds was summarized by placing all of the herds into quartile groups (25 percent in each group) and then calculating an average EATA for each group. The table shows the results.

Average EATA's for Milk, Illinois Herds,

	Quartile Group			
Breed	1	2	3	4
Ayrshire	+294	+181	+94	+2
Brown Swiss	+329	+240	+152	-5
Guernsey	+277	+169	+100	+16
Holstein	+308	+164	+76	-1
Jersey	+286	+165	+114	+12
All breeds	+304	+166	+80	+0

The average EATA for milk from the top 25 percent of the herds in the 9-state area served by the computing center were: Ayrshire, +325; Brown Swiss, +445; Guernsey, +363; Holstein, +347; and Jersey, +431. It is disturbing to note that the average EATA for milk from the top 25 percent (quartile 1) of herds for each breed in Illinois is lower than that for comparable groups of herds in the 9-state area. The need to improve breeding programs in Illinois is critical. The data in the table make it possible for each dairyman to determine where his herd ranks in terms of EATA's for milk.

The EATA is a genetic evaluation of cows and herds, giving an indication of what a dairyman has accomplished in his breeding program. Taking time to select bulls

with high Predicted Differences for Milk and Fat and using the EATA evaluations will make it possible for each dairyman to improve the genetic ability of his herd to produce at a more profitable level. (R.V. Johnson, Extension Dairyman)

Dairy Price Trends

Farm prices in Illinois for April were down 8 percent compared to March. Milk cows increased in price while milk was unchanged from the month before. Several dairy-related prices in Illinois and the United States are listed below (source: May 12, 1980 Illinois Farm Report).

	Illinois	U.S.
Dairy feed, 16% protein (per ton)	$188	$164
Soybean meal (per cwt.)	$ 12.50	$ 12.20
Corn (per bu.)	$ 2.40	$ 2.31
Milk cows (per head)	$1,230	$1,190
Fluid milk (per cwt.)	$ 12.60	$ 12.90
Manufactured milk (per cwt.)	$ 12.10	$ 11.90
Milk: feed ratio	1.33	1.55

The hay inventory on Illinois farms as of May 1 totalled 866,000 tons, which is up by 101,000 tons compared to the same time in 1979. The prices for milk remain favorable. Surplus milk is accumulating. Check your costs and eliminate marginal cows. Efficiency is still the name of the dairy game. (M.F. Hutjens, Extension Dairyman)

M.F. Hutjens, G.W. Harpestad, R.V. Johnson Extension Dairymen

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 9, Number 4 *August, 1980*

W.R. Gomes, New Department Head

W. Reginald Gomes has been appointed Professor and Head of the Department of Dairy Science, effective February 1. He will be coming to Illinois from the Dairy Science Department at Ohio State University in Columbus where he has been conducting research about and teaching reproductive physiology.

Dr. Gomes is a native of California. He was raised on a dairy farm near Hanford. His 4-H and FFA projects included dairy, beef, sheep, and poultry. He was a member of the FFA dairy judging team, participated in numerous activities at the local and state level, and was awarded the State Farmer degree.

His interest in agriculture as a career lead him to enroll at California State Polytechnic University where he completed a bachelor's degree in 1960. He was a member of the collegiate dairy judging team that won first place in the Cow Palace and Great Western contests. He has served as the assistant dairy superintendent at the California State Fair and at the Grand National Dairy Exposition.

Dr. Gomes continued his education at Washington State University where he received a master's degree in 1962, and at Purdue University where he received a Ph.D. degree in 1965. Dr. Gomes has been on the staff at Ohio State since 1965. We look forward to welcoming Dr. Gomes, his wife Carol, and their two children to Illinois next February.

Fly Control on Pastured Dairy Cattle

Flies are beginning to build up on pastured cattle. Horn flies, face flies, and stable flies are the major ones that attack cattle on pasture in Illinois. The number of flies is increasing. On unsprayed herds of pastured cattle in southern Illinois during early July, the counts averaged 250 horn flies, 5 to 10 face flies, and 3 to 5 stable flies per animal. Follow a good control program and keep at it consistently.

Apply crotoxyphos (Ciodrin or Ciovap) as a 1- to 2-percent spray of the oil- or water-base type. Use crotoxyphos at 1 to 2 ounces per animal 1 to 3 times a week. Use a small hand or electric sprayer or an automatic walk-through sprayer. A 1-percent, water base spray of crotoxyphos at 1 pint per animal per week is also effective. Crotoxyphos is the most effective insecticide for controlling face flies. Pay particular attention to the animal's legs and undersides when spraying.

The above sprays are the best ones. Many dairy farmers use dust bags or back oilers or stirofos (Rabon) ear tags. Regardless of the insecticide employed, these devices provide effective control for horn flies only, with a partial reduction in the number of face flies and stable flies. If used, keep oilers and dust bags in good working order and if possible as a forced treatment. For best results, install 1 stirofos ear tag in each ear on the front side. Do not treat animals under 6 months of age with the ear tags.

A deformity of the ear could result. Insecticides given through the feed such as stirofos (Rabon), methoprene (Altosid), and phenothiazine are not suggested for use in Illinois. (Steve Moore III, Extension Entomologist)

Tips on Corn Silage

Corn silage continues to be one of the major dairy forages in Illinois. Providing high-quality silage that is palatable will pay dividends in the feeding program. Several current tips are listed below.

1. Generally, plant cells cannot hold more than 72 percent water. The increased compaction of forages in silos that are wide and high will cause seepage. As a rule of thumb, whole-plant corn silage with 70-percent moisture can be ensiled in silos less than 40 feet high. Lower the moisture level 1 percent for each additional 10 feet in height.

2. Fill the silo rapidly to encourage fermentation. A wet density of 30 pounds per cubic foot will minimize heat damage. Each day, fill at least 7 tons of corn silage in a silo that is 16 feet in diameter, 10 tons in a 20-foot silo, and 13 tons in a silo 24 feet across. Such fills will meet the minimum density standard of 30 pounds per cubic foot.

3. Adding nonprotein nitrogen (NPN) as cold-flow ammonia, urea, or a commercial product is a satisfactory method nutritionally, and the NPN also acts as a preservative. Add approximately 5 pounds of nitrogen per wet ton of corn silage (6 pounds of ammonia, 10 pounds of urea, or 35 to 40 pounds of a commercial product).

4. Minerals can be added when ensiling to balance the mineral profile of the corn silage at feeding. Limestone, dicalcium phosphate, and trace-mineralized salt could be added. The level of each mineral added will depend on the amount of corn silage to be fed and the mineral requirements of the cattle. This method overcomes free choice feeding of minerals or metering mineral on top of silage.

5. Research with chopped and rolled corn silage prior to feeding indicates some nutritional improvement. The level of undigested corn particles and whole kernels was lower in rolled corn silage. The rolled corn silage was consumed more completely with less residue from stalks and cobs remaining. The shredding action of the roller mill reduces bulkiness and increases palatability. No reduction in the fat test occurred. The conditions favoring the use of rolled corn silage include: (1) mature corn silage with hard kernels and coarse plant stalks; (2) dry or coarsely chopped silage; (3) corn silage used as a major portion of the ration; and (4) a high passage of kernels in the manure.

6. Drought-damaged corn makes acceptable corn silage. The feed value can easily be worth three-fourths as much as normal corn silage or more. Allow the crop to dry down to 70 percent moisture to avoid seepage. Nitrate accumulation is possible. Dilute stress corn silage with dry forage and grain and gradually adapt the cattle to the silage. (M.F. Hutjens, Extension Dairyman)

Michael Murphy Joins the Dairy Staff

On July 7, Dr. Michael Murphy joined the staff of the Department of Dairy Science. His research interests are in dairy cattle feeding, specializing in ruminant nutrition and metabolism. His teaching responsibilities will include courses on feeding dairy cattle at both the undergraduate and graduate levels.

Dr. Murphy is a native of California. He completed his doctorate this year at the University of California at Davis. He and his wife Diane have one child. We welcome Dr. Murphy to the University of Illinois and to the Department of Dairy Science.

Fly Control in Dairy Barns

House flies and stable flies are becoming numerous in and around dairy barns. These flies spend most of their time at rest on the walls, ceilings, support posts, and other places--staying only a short time on the animals. Stable flies reduce beef and milk production by attacking the legs and bellies of the animals. Flies take blood, usually twice each day. An average of 1 stable fly per animal will reduce milk flow by 0.7 percent. House flies have little or no effect on production, but are a general nuisance. Keep up your control program, and work at it consistently.

1. Practice good sanitation. Eliminate fly-breeding materials--such as manure, rotting straw, wet hay, and feed--as often as possible. Spreading this refuse where it can dry makes it unsatisfactory for fly development. When manure cannot be spread frequently, cover the pile with black plastic sheets, held down with old tires, sandbags, or other weights. If cleanup is not done weekly, leave a 4- to 6-inch residue of manure in the pens. This allows predator insects and diseases of fly maggots to survive, which will hold down the buildup of future fly populations.

2. Apply a barn spray to the point of runoff on the ceilings and walls of all buildings housing cattle. Also spot-spray outside around windows and doors and along the fences in the lot. The insecticides listed are the ones suggested for this purpose.

Insecticide	Amount per 100 gallons of water (gallons)	Length of Control (weeks)
dimethoate (Cygon), 23-percent liquid concentrate	4	3 to 4
fenthion (Baytex), 45-percent liquid	3	4 to 6
Ravap (stirofos plus dichlorvos) 29-percent liquid concentrate	4	2 to 4
stirofos (Rabon), 24-percent liquid concentrate	4	2 to 4

Cover feed and water troughs before spraying. DO NOT SPRAY ANIMALS WITH THESE MATERIALS AT THE DOSAGES SUGGESTED. Remove all animals before spraying the barns. Do not spray the milk-storage room.

3. Supplement good sanitation and barn sprays by using a spray bait material. Use 4 ounces of 23-percent dichlorvos (DDVP) EC, or 1 ounce of 58-percent naled (Dibrom) EC in a mixture of 1 gallon of clear corn syrup and 1/2 gallon of warm water. Apply the mixture from a small tank sprayer to the favorite roosting areas.

4. For large drylot and enclosed confinement operations, you can use a space spray applied from a mist blower. During peak fly periods, treatments will be needed every 3 or 4 days. The application can be made with cattle present, but avoid direct application to the cattle and to exposed feed and water. Do not apply in conjunction with animal or shelter treatments of organophosphate or carbamate insecticides. The space spray should be the only chemical method of fly control employed. There is no need

to spray cattle in drylot. The suggested insecticides and rates are listed below.

Insecticide	Amount per 100 gallons of water	Method
dichlorvos (Vapona), 23-percent liquid concentrate	2 gallons	Apply at 5 gallons of finished spray per acre
naled[a] (Dibrom), 58-percent liquid concentrate	5 pints	With mist blower over animals & pens every 3 to 7 days

[a]Clean spray equipment thoroughly after treatment to prevent corrosion.

For fly control in enclosed confinement operations, use good sanitation, screening if practical as well as wall sprays, spray baits, or both. Spraying with a mist blower may be practical in some situations. Occasionally, a larvacide to control fly maggots in the manure pits is helpful. Use dichlorvos (DDVP, Vapona). Mix 1 quart of the 2-pounds-per gallon liquid concentrate in 12 gallons of water. Apply this diluted spray to the manure at 2 gallons per 1,000 square feet. Repeat treatments may be needed every 1 to 2 weeks. (Steve Moore III, Extension Entomologist)

M. F. Hutjens, D. W. Harpestad, R. V. Johnson Extension Dairymen

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

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Excess Milk Production, A National Problem

An imbalance in supply and demand has occurred as milk production has increased in the national dairy herd (currently 3 percent above 1979) and consumer preferences have switched to other protein sources (cheese consumption has dropped 1 percent). The surplus of milk, approximately 10 billion pounds purchased by the government over 2 years, looms over markets and tests the current price-support program. If dairy producers do not do their part in bringing supply into a closer balance with demand, the Congress may move to alter the dairy price-support program. Table 1 presents an overview of the current situation.

An industry task force has pulled together experts in herd management to provide dairy producers with information to use in developing a personal plan to help alleviate the national milk surplus and to improve dairy profitability today while assuring the stability of the price-support program for the future. Dairy farmers have several options to help alleviate the imbalance in supply and demand.

1. Cull marginal cows NOW! Such cows do not return a profit and contribute to the surplus milk supply. Include on your cull list the cows with chronic mastitis, those with long calving intervals, unruly-poor disposition, and those susceptible to disease.

2. Review your feed inventory and feed costs. Profit margins will shrink as the feed-to-milk ratio narrows. Feed the high-producing cows well rather than feeding all cows marginally.

3. Consider expansion plans carefully. Do not speculate with the expectation of higher milk prices and lower feed costs.

4. Be sure individuals starting a dairy herd are well aware of the current situation.

Table 1. Milk Production, Utilization, and Removals

Item	1977-78	1978-79	1979-80	1980-81
Total supply (billion lb.)	127.2	127.7	133.2	134.6
Total utilization (billion lb.)	124.0	126.6	125.0	127.1
CCC net removals (billion lb.)	3.2	1.1	8.2	7.5
CCC expenditures (millions)	$ 413	$ 230	$ 1,300	$ 1,255
Number of cows (millions)	10.9	10.7	10.8	10.8
Milk per cow (lb.)	11,207	11,371	11,745	11,900
All milk price (cwt.)	$10.23	$11.74	$12.75	$14.35
Cull-cow price (cwt.)	$32.79	$48.47	$46 to 50	$49 to 55

5. Increase the promotion of milk and dairy products. Dairy producers in western U.S. have proven that promotion pays off with higher consumption.

6. All cows should be on a DHI testing program to determine which ones are not paying their way so they can be culled.

Dairy farmers must remember that unless they demonstrate their willingness to do their part toward balancing production and demand, a solution to the problem may be taken out of their hands. (M.F. Hutjens, Extension Dairyman)

Stray Voltages in the Milking Parlor

Decreased production can occur because of small electrical voltages that can exist in different parts of a milking parlor with which cows come in contact. Dairymen need to be alert to the possibility. The symptoms can include a reluctance to enter the milking parlor, jumping when milkers are attached, a nervousness all during the milking process, slow or reduced milk letdown, and a reluctance to drink water or come in contact with certain parts of the parlor.

Often, the symptoms are mild and not easily observed. The symptoms may be intermittent if the voltage fluctuates. Such symptoms, of course, are not necessarily always caused by voltages. Other possibilities should be checked out and observations carefully made.

What causes small voltages? Of course, faulty equipment that is not properly grounded can create small or large voltages. Such equipment can even cause fatalities. But small voltages can also occur within properly wired and maintained systems. A complete understanding of wiring systems is beyond the scope of this article, here is some pertinent information.

Electric codes require the grounding of the neutral wire in wiring systems and, in turn, the grounding of equipment items to this neutral wire at the electrical-service entrance. Thus, all neutral wires and ground wires connect together electrically and to the ground rods at buildings, the ground rod at the meter pole, the ground wire of the power line serving the farm, and to the ground rods connected at regular intervals along the power line. There are some very good reasons for doing this.

Every electrical wire offers resistance to the flow of current. There will be a difference (usually small) between the voltages at the two ends of a wire carrying current. A neutral wire carrying a high current, because of this, can be operating at a voltage slightly different than "true" ground. This would mean that everything connected to the neutral wire near the end where the load is can be at a slightly different voltage than the concrete in the parlor, which is in good contact with the earth. If there is a poor connection in the neutral wire between the load and the transfer, the differential voltage can be substantial. When the cow stands on the concrete and touches something at this different voltage, she gets a shock. The intensity of the shock depends on the voltage and on the electrical resistance of the cow.

How much voltage is too much? Generally 1/2 of a volt or less does not create a problem. Some cows can tolerate more.

If you think you have a problem, the first person to consult is your electrician. If the problem is his first such "case," you will learn together. Generally, he would begin by measuring the voltage between the different parts of the system that the cow touches, such as the floor and the metal parts of stalls, the floor and milkers, the floor and feeders, the stalls and milkers, and so on. He will do this with a meter that will measure accurately 1/2 of a volt or less of alternating current. Try the meter on the direct-current output of a flashlight battery, it should not respond.

If you find voltages large enough for concern, one procedure for analyzing what is going on is to drive a ground rod in moist earth about 50 feet away from any electrical apparatus to establish a "true ground" and then measure voltages from this to various items of equipment in the structure.

Such checking can be time-consuming and frustrating, and it may have to be done during milking time. The procedure is one of noting what equipment items are starting when voltages appear, and turning them off to see if it will stop the voltage. Do not stop at the milking parlor. Equipment in other buildings can cause problems in the milking parlor, too.

A part of the procedure should be to check wiring in order to be sure it is adequate for the load it carries and to see whether it has been installed according to electric-code requirements. Any suspicious connections in neutral wires, ground rods, other connections, and the like should be tightened to be sure the connection is a good one. Check thoroughly any substantial 120-volt loads, since 120-volt loads produce currents on the neutral wire and 240-volt loads do not. Remember to check hidden loads such as sump pumps. A hook-on ammeter can be helpful for checking the neutral current at various points.

If you and your electrician cannot track down the problem, turn off all the electricity on the whole farm. If the voltage is still there, it is probably in the power supply.

At that point, contact your electric power supplier. Explain what you have done. Most firms are anxious to help. If the voltage is coming from the power line neutral and if no other cause can be found, the farmstead wiring can be isolated from the power-line neutral by using an isolating transformer. Power suppliers are reluctant to do this because it takes away something from the safety of the system, but the procedure works.

For those who do not have a problem and do not want to have one, here are some suggestions. Have all wiring done by competent electricians, carefully adhering to the electric code. Be sure the wiring installed is more than adequate for the load. Try to get equipment that operates on 240 volts as much as possible; that holds down neutral currents. Do not use make-shift arrangements--an old beatup radio or frayed extension cord when touching equipment can cause plenty of trouble.

Two publications provide excellent information about stray voltages:

"Detecting Stray Currents in Milking Parlors", Summer, 1978 Quarterly, Western Regional Agricultural Engineering Service, Gilmore 116, Oregon State University, Corvallis, OR 97331

"Stray Voltage Problems with Dairy Cows," Folder 552-1980, Agricultural Extension Service, University of Minnesota, St. Paul, MN 55108
(William Peterson, Extension Agricultural Engineer)

Separated Solids for Free-Stall Bedding

The possible role of dairy fiber waste as a low-cost bedding material in free stalls has caused some concern because of recent reports about increased incidences of mastitis. Researchers at Brigham Young University used separated manure solids in the free-stall units for their 400-cow university herd. The trial was an attempt to reduce the high cost of sawdust bedding. After changing to manure solids, the incidence of clinical mastitis increased. Culture results indicated a rise in coliforms from 7 to 46 percent, primarily E. coli, after switching from sawdust to separated manure solids.

The use of manure solids as bedding was discontinued and sawdust was employed again. The mastitis situation improved, but the cost of the sawdust was prohibitive. So research with separated solids continued.

Recently, workers at Brigham Young University found that composting the separated solids in stacks caused the temperature inside the stack to peak at about 130° F. after 3 weeks, reducing the levels of coliform bacteria. Coliform counts of freshly separated manure solids (60 percent dry matter) were below 1 million per gram, only a few were found after a 3-week period of composting. Separated solids that had been composted were placed in the free stalls as bedding. No adverse effects were reported.

Management tips:

1. Remember that using manure solids for free-stall bedding carries the risk of coliform mastitis. Use a product for dry-cow treatment that contains drugs with both gram-negative and gram-positive spectra.
2. Do not use manure solids until the coliform counts are below 1 million per gram.
3. Make sure the manure solids are at least 60 percent dry matter before use. This can be accomplished by composting solids for 5 weeks and storing them in covered sheds during wet weather.
4. Make every effort to see that the udder is washed carefully in the parlor and that prep water does not run off the animals' flanks onto the udder, teats, and inflations during milking. The solids may become contaminated again with coliform organisms in the free stalls and the cows' udders and sides may become highly contaminated.
5. Always dip the teats after every milking.
6. Keep the animals on their feet for at least an hour after milking to allow closure of the teat sphincter.
7. Build up bedding with manure solids slowly in free stalls to avoid high moisture and heating in the deep areas.
8. Be on the look out for coliform mastitis.

(E.H. Jaster, Dairy Scientist)

M.F. Hutjens, G.W. Haapstad, R.V. Johnson Extension Dairymen

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 9, Number 6 *December, 1980*

Feeding Strategies for the 80's

The 1981 Illinois Area Dairy Days are coming up soon! Mark your calendar and plan to attend a session near you.

Date	Location
January 6	Sterling, Emerald Hill Country Club
January 7	Freeport, Holiday Inn
January 8	Marengo, Cloven Hoof Restaurant
January 9	Kankakee, Redwood Inn
January 13	Effingham, Extension Center
January 14	Breese, American Legion
January 15	Quincy, Ramada Inn
January 16	Peoria, Heritage House

Under this year's theme "Feeding Strategies For the 80's" one major presentation will concern Managing the Rumen, a discussion about protein solubility, rumen pH, fiber digestion, protected protein and fat, and digestion factors in the rumen. Another topic will be Feeding Systems Spell Success. That presentation will be about total mix rations, electronic grain feeders, and forage systems and types as they relate to optimizing milk production.

In the morning the area DHI business meeting will be held with a look at the priorities facing the Illinois DHI program. A $3 registration fee per farm unit will be charged to cover the costs of the *1981 Illini Dairy Report* and program expenses. Lunch will be available (Dutch treat). Several locations will feature commercial displays and exhibits. Plan now to attend the 1981 Area Dairy Day event nearest you with a neighbor or friend. Contact your county Extension Service Office for the times and other details. (M.F. Hutjens, Extension Dairyman)

Using a Teat-Sealer To Prevent Mastitis

Dipping the teats after milking is an essential in order to prevent the bacterial infections that cause mastitis in dairy cows. By using teat dips, the number of streptococcus and staphylococcus infections can be reduced. There is a concern, however, that reducing streptococcus and staphylococcus infection rates may allow coliforms of environmental origin to flourish. Coliform mastitis is not as widespread as streptococcus and staphylococcus infections; when coliform mastitis does occur, it is quite severe and some dairy cows may die. Teat-dipping is important during the first few hours after milking when the cow is most susceptible to infection by coliforms.

One of the current products available for teat-dipping is a teat sealer. It acts as a physical barrier, or shield, preventing the entrance of bacteria.

A product presently in use and that has been field-tested is made of an acrylic latex compound developed specifically for use as a teat sealer (Teat Shield, Minnesota Mining and Manufacturing--(3M). The sealer dries in 10 to 20 minutes. The product softens when water is applied at the next milking and can be removed by slight rubbing. Any sealer that has not come off

Table 1. Minnesota Study, Teat-Sealers and Mastitis, 1980

Type of infection	No. of quarters with infections		Total no. of infections		Percent reduction[a]
	Treated	Control	Treated	Control	
Staphylococcus aureus	51	74	67	93	28
Staphylococcus epidermis	82	111	106	159	33.3
Streptococcus agalactiae	78	93	95	115	17.4
Streptococcus spp. other than *agalactiae*	83	87	115	124	7.3
Coliforms	7	24	7	29	75.9
Total	301	389	390	520	25

[a]The number of infections in control, minus the number of infections in the treated group divided by the number of infections in the control group.

before milking will collect on the milk filter.

The effect of using the sealer in relation to new intramammary infections was evaluated in field trials by researchers at the University of Minnesota. Dairy herds were screened on the basis of a bacterial analysis of milk samples by quarter and by veterinary records. The selected herds had: (1) sufficient nonclinical mastitis to challenge the efficacy of the teat-sealer; (2) a history of coliform mastitis outbreaks, and (3) no teat-dipping at the time of screening. Four herds were selected for the study, ranging from 35 to 45 cows. In each herd the 2 teats on the right side of the mammary gland were dipped in the teat-sealer immediately after milking. The 2 left teats served as untreated ones for control purposes. Quarter milk samples were collected monthly, and the bacterial infection results are presented in Table 1.

The overall incidence of infections caused by *S. epidermidis* (33.3 percent), *S. aureus*. (28.0 percent), and coliforms (75.9 percent) was reduced. The reduction of 75 percent in new coliform infections is important since most disinfectant-type teat dips do not reduce the infection rate for that group of organisms. However, the reduction in gram-positive organisms *S. agalactiae* (17.4 percent), *S. aureus* (28 percent), and *S. epidermidis* (33.3 percent) is less than that usually observed in similar trials with disinfectant-type teat dips. A teat sealer appears to be useful in special situations where coliform infections are a major concern. Additional research would be needed in order to determine the efficacy of a teat sealer in reducing the rate of new infections caused by gram-positive bacteria. Using the teat sealer is effective against infections caused by coliform organisms. The popularity of teat sealers among dairy producers will depend on the cost, efficacy in reducing the presence of various mastitis-causing organisms, and the benefits of routine teat-dipping with a sealer compared to using present teat dips. (E.H. Jaster, Dairy Management)

Will the Dairy Support Program Survive?

The government's price-support program and CCC purchases will highlight the 1981 Illinois Dairy Seminar, scheduled for January 5 and 6 at the Continental Regency Hotel in Peoria. The seminar is sponsored by the Illinois Milk Producers Association and the University of Illinois Department of Dairy Science. The speakers will include Bill Motts, USDA and Hollis Hatfield, American Farm Bureau Federation.

Other topics will be covered including the promotion of dairy products, an update on research in dairy production, the economic

outlook for dairying and associated trends, and monitoring the residues of antibiotics in milk. For complete program details, contact John Campen at the Farm Bureau Headquarters, 1701 Towanda Avenue, Bloomington, IL 61701. Telephone 309-557-3251.

Dairy Judging Teams Had a Good Year

The Illinois Senior 4-H Dairy Judging Team competed in two contests. The team placed 5th out of 15 teams at the Pennsylvania All-American Invitational Youth Dairy Judging Contest in Harrisburg on September 22. The team also ranked 1st in Brown Swiss, 2nd in Holsteins, and 5th in judging Ayrshires and Jerseys. Julie Butler placed 7th in judging all breeds. On October 1, the team placed 5th in Brown Swiss and 27th out of 37 teams at the Official National 4-H Dairy Judging Contest at Madison, Wisconsin. Lynn Zobrist placed 4th in judging Brown Swiss.

Members of the senior team at both contests were Julie Butler, Chebanse; David Van Raden, Forreston; Craig Woker, Greenville; and Lynn Zobrist, Pocahontas. Ralph Johnson, UI Extension Dairy Specialist, coached the team.

The Illinois Junior 4-H Dairy Cattle Judging Team placed 6th out of 13 4-H teams in a contest held during the Mid-South Fair at Memphis, Tennessee on September 24. The team also ranked 1st in Jerseys and 3rd in Holsteins. Jeff Elsas placed 5th in judging Jerseys. The member of the Junior Team were Jeff Elsas, Lincoln; John Erbsen, Lanark; Mark Knief, Burlington; and Brian Woker, Greenville. Mike Hutjens, UI Extension Dairy Specialist, coached that team.

The University of Illinois Collegiate Dairy Cattle Judging Team coached by Sidney Spahr placed 15th out of 36 teams at the National Intercollegiate Dairy Judging Contest in Madison, Wisconsin on October 1. The team was composed of Tim Aggen, Morrison; Kevin Stoll, Chestnut; Barb Weas, Griggsville; and Greg Galbraith, Gurnee. The team placed 3rd in Ayrshires and Galbraith ranked 5th in Holsteins.

Tim Aggen, Morrison; Ron Lawfer, Kent; Paul Van Raden, Forreston; and DeWayne Dill, Tremont placed 14th out of 22 teams in a contest at the Dairy Cattle Congress in Waterloo, Iowa. This team, coached by Gene McCoy, also placed 2nd in Ayrshires and 4th in Holsteins, with Paul Van Raden ranking 4th in both Ayrshires and Holsteins.

A team consisting of DeWayne Dill, Greg Galbraith, and Ron Lawfer placed 3rd in judging Jerseys in a contest held at the Mid-South Fair, Memphis, Tennessee. Dill was 3rd in Jerseys in that contest. The team ranked in the lower half overall.

Another team consisting of Greg Galbraith, Ed Glaser of Morton, Kevin Stoll, and Barb Weas ranked 20th out of 21 collegiate teams competing in the Pennsylvania All-American Youth Invitational Contest at Harrisburg. (R.V. Johnson, Extension Dairyman)

Illinois-Iowa Dairy Handbook

Two challenges dairy producers face are keeping up with the latest information and practices in the dairy industry plus finding appropriate general guidelines and recommendations. Now, there is a new source for such information. Dairy Specialists from Illinois and Iowa have developed the *Illinois-Iowa Dairy Handbook*. This handbook will be available initially at the 1981 Area Dairy Day events and then on a subscription basis. The handbook materials, organized in a convenient 3-ring notebook, cover five general categories.

- Management
  1. A planning guide for dairy operations.
  2. Using computers on the dairy farm.
  3. Managing dry cows.
- Feeding
  1. Using buffers.
  2. Feeding high-moisture corn.
  3. Feeding strategies for protein in

dairy rations.

- Milking and Mastitis
  1. Interpreting somatic cell counts.
  2. Using automatic detachers.
  3. Planning aids and layouts for dairy parlors--trigon, polygon, and rotary as well as side-opening and herringbone ones.
- Breeding
  1. Prostaglandins.
  2. Genetic tools.
  3. Genetic improvement trends.
  4. Reproduction management.
  5. Heat detection
  6. Progesterone.
  7. Sire-summary interpretation.
- General
  1. Hoard's Dairyman Calf Care Bulletin.
  2. Illinois-Iowa 1981 Revised Feeding Guide.
  3. Midwest Plan Service Dairy Housing and Equipment Handbook.
  4. North-Central Guidelines for Analyzing Milking Systems.

Additional guide sheets will be developed and mailed to update and expand the handbook. The cost will be $10 to $15 which includes all future guidesheets. Dairy producers, agribusiness personnel, and educators are invited to subscribe. Check out the new handbook yourself at one of the 1981 Dairy Day events. (M.F. Hutjens, Extension Dairyman)

Time To Resubscribe

By now you should have received a renewal form for subscribing to the 1981 issues of *Illinois Dairy Digest*. Be sure to return the form with your payment so you will continue to receive the newsletter. In case you misplaced your renewal form, the cost is $4 for 4 issues. Make your check payable to the University of Illinois Agricultural Newsletter Service and send it to: Agricultural Ag Newsletter Service, Cooperative Extension Service, 116 Mumford Hall, Urbana, IL 61801. Remember that the subscription cost is tax-deductible. (M.F. Hutjens, Extension Dairyman)

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Volume 10, Number 1 *February, 1981*

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Your handbook will be sent by United Parcel Service for quick delivery. We invite you to subscribe now. New materials will be sent periodically for the next couple of years to keep you up to date on the latest in research and management techniques. Order your Dairy Handbook today. (M.F. Hutjens, Extension Dairyman)

Teat Lesions and Mastitis

Teat lesions create a problem that can effect total milking management. Lesions may affect only a few cows, or may pose a serious problem for the herd. Cows do not die from teat lesions, but the lesions affect the cow's disposition during milking which can frustrate both the cow and the dairy producer. Quarters with teat lesions frequently become infected, resulting in higher levels of mastitis.

Lesions can ge grouped into five categories: (1) traumatic, usually the most dramatic, frequently caused by the cow stepping on her own teats or by wire cuts; (2) infectious, generally caused by viral agents such as pseudocowpox; (3) chemical, usually the result of using sanitizing solutions improperly as teat dips; (4) environmental, caused by the exposure of the teat to the elements causing chapping, sunburn, or freezing; (5) lesions at the teat end orifice, with the lesions appearing either as a band or ring of tissue surrounding the teat orifice. More acute forms of teat

lesions may appear with a loss of the outer skin (epithelium) and a formation of a scab over the teat orifice.

The relationship between teat lesions and mastitis has been investigated and classified according to the following system from photographs of teat ends by University of Minnesota researchers.

1. Normal. A teat with a smooth, well-closed orifice that is not raised.
2. Smooth chronic ring. The appearance of a smooth, raised ring of tissue around the teat orifice. The lesion may be further classified as very mild, mild, moderate, or severe.
3. Rough chronic ring. A rough appearance of the raised ring of tissue around the teat orifice. The lesion may be further classified as very mild, mild, moderate, or severe.
4. Acute. A hemorrhagic (blood-like) appearance of the teat orifice. A scab may be present around the teat orifice.
5. Unclassified. Teat ends disfigured because of trauma or by warts involving the teat orifice.

Another study was conducted in Minnesota dairy herds. Milk samples and photographs of teat ends were examined from 3,982 quarters. The teat ends were classified according to the categories listed here and by various types of lesions on teat ends. The results were correlated with mastitis. Mastitis infection was determined by milk bacteriology (isolation of *Streptococcus agalactia*, *Staphylococcus aureus*, or coliforms) and somatic cell counts (greater than 1.5 million). Of the quarters studied, 1,068 (26.8 percent) were infected. Table 1 lists the number and percentage of infected quarters by classification.

The results indicate no difference in infection rates between normal teats and those with various categories of ring lesions. However, higher levels of infection existed in those quarters with acute teat lesions, traumatic injuries, and teats that leaked milk. (E.H. Jaster, Dairy Management)

Table 1. Total Number of Quarters and Percentage of Infected Quarters, by Classification[a]

Classification	Percent Infected	Total No.
Normal	30.9	554
Smooth chronic rings		
Very mild	24.8	1177
Mild	22.4	1003
Moderate	26.6	312
Severe	34.7	72
Rough chronic rings		
Very mild	20.8	125
Mild	26.1	199
Moderate	32.5	151
Severe	26.2	80
Acute	43.8	16
Unclassified		293
Traumatized	60.9	
Leakers	41.6	

[a]Farnsworth, R.J., and Sieber, R.L. 1979. Relationship of teat end lesions to intramammary infections. Proc. 19th Annual Meeting, National Mastitis Council, Louisville, pp. 17-24.

Illinois-Indiana Dairy Management Clinic

"Getting the High-Producing Cow with Calf" will highlight the 1981 Dairy Management Clinic scheduled for March 5 and 6 at the Clock Tower Inn in Rockford. The two-day program will also include computer applications on dairy farms, automation, and capital management. Dairy producers, agribusiness personnel, and university researchers will be among the speakers. An optional tour of a dairy farm will be held on the afternoon of March 6 at Star Brook Holsteins. For details and registration information, contact Gary Harpestad, 315 Animal Sciences Laboratory, 1207 W. Gregory Drive, Urbana, IL 61801. Telephone: 217/333-0510. Plan now to attend the clinic in Rockford on March 5 and 6.

Watch for Aflatoxin in Corn

Recent corn sampled in southwest Illinois revealed that the level of aflatoxin in drought-stressed or damaged corn has exceeded 800 parts per billion (ppb). The lactating dairy cow can transfer aflatoxin at a ratio of 1 ppb in milk from 300 ppb in the dry matter of the total ration. The maximum level allowable in milk is 0.5 ppb. Since high-producing cows typically consume grain and forage at 50 percent each, grain levels above 300 ppb can cause problems.

If you supect aflatoxin contamination (poison produced by moldy corn), have the corn checked immediately. If a cow's milk is contaminated, the damaged feed must be removed from the ration for 48 to 72 hours before levels in the milk clear. Don't take a chance! (M.F. Hutjens, Extension Dairyman)

Using the Embryo Transfer Index To Select Cows

A recent ad in *Holstein World* read "Select Your Embryos, Select Your Recipients, We'll Do the Rest." It sounds easy, but how are embryos to be selected? A 97-score cow with 55,600 pounds of milk in 305 days would be a logical dam for an embryo but no such cow exist. A 97-score bull with +2,500 Predicted Difference for milk, a +60 Predicted Difference for fat, and a +3.00 Predicted Difference for type would be a logical sire for an embryo, but no such bull exists. It goes without saying that the cow, the bull, and several daughters are All-Americans. The pedigree has 5 generations of excellent females, all with excellent udders that produced more than 200,000 pounds of milk (lifetime production). All females in the 5-generation pedigree produced 1,000 pounds of fat in a 305-day lactation. Yes, dairymen know what they want: the most milk and the most fat from the prettiest cows that transmit their strengths to their offspring while the cows live happily ever after.

If no such animals exist, how can the goals be reached? Variation, as a prerequisite, and genetic theory give us hope that future generations will have new and superior combinations of genes. Positive assortative matings (the best to the best) increase the probability of outstanding individuals. Remember, too, that if positive assortative matings are practiced, the worst animals will also be mated to each other, thus increasing the probability of undesirable animals. The result would be no change in the average for the population.

Selection and embryo transfers can help increase the population average. The increased reproduction rate from embryo transfers plus accurate selections of superior cows will help bring about more outstanding offspring from positive assortative matings. The key is selection of superior cows as donors for embryo transfer. Bulls available through AI are a highly selected, elite group.

Positive assortative matings will increase the advantage of superior offspring, making it easier to select the next generation of parents. The undesirable offspring can be culled out. The superior individuals can be superovulated, increasing the number of offspring with outstanding genetic characteristics.

Which animal would you select from your own herd for superovulation? The candidates would be the top-producing cow, most structurally sound cow, easiest cow to work with, and the cow that becomes pregnant by the first service, or unfreshened daughters of those cows. In general, superovulate the animal from which you would like more offspring.

With a realistic minimum estimate of $4,000 per superovulation, all cows cannot be donors. Decisions must be made between outstanding cows with different characteristics. First, define clearly the goal of your breeding program. In the past, maximizing milk production was a common one. Currently, maximizing

profit is becoming more widespread.

A multitrait selection index can help you rank your cows. Keeping your goal in mind, establish relative economic values for the characteristics of your cows. Consider the uniqueness of your cows and how rare their characteristics are in relation to the breed and total dairy population. The uniqueness may be quantified by numerically scoring the traits, deviating the individual score from the herd average, and dividing the deviation by the standard deviation of the trait.

To review, a multitrait index for Holstein bulls is TPI where TPI X [(3)PDM/560] + [(1)PD%/.09]+[(1)PDT/.7] 50; 3:1:1 are the relative economic values of PDM, PD%, and PDT respectively; 560, 0.09, and 0.7 are the corresponding standard deviations; and 50 is the multiplier. A similar index can be made for potential ET donors. The components of the index could be milk, milk fat percentage, type score, and number of services per conception as a measure of reproduction. Preliminary analyses support relative economic values of 3:1:1:1 for milk, fat percentage, type, and reproduction respectively. Estimates of standard deviations are 2,500 pounds for milk, 0.32 for the fat percentage, 3.0 points for type, and 1.6 for number of services. Define the embryo transfer index (ETI) as

$$ETI=\left[\frac{3(\text{milk}-15{,}000)}{2{,}500}+\frac{\%\ \text{fat}-3.5\%}{.32}+\frac{\text{Type}-80}{3.0}+\frac{2-\text{services}}{1.6}\right]X50$$

where milk, percent fat, type, and services represent information from a single record of a cow; 15,000, 3.5%, 80, and 2 are approximate averages; and 50 is the multiplier. Milk refers to 305-day, mature-equivalent milk production; percent fat is the average for the 305-day record; and type is the actual classification score. An improvement in ETI would replace type by breed age average (BAA), but the standard deviation of BAA is not available. The reproduction component is different from the others because one service per pregnancy is most desirable; therefore, the individual's services are substracted from the approximate average of two.

Examples of ETI's for three cows are shown in Tables 1 and 2. Bess, the top cow for milk and percent fat, has the highest ETI. Based on the embryo transfer index, Bess is the top choice for superovulation.

Table 1. Characteristics of Three Sample Cows and Their Embryo Transfer Index

Cow	Milk (lb.)	Pct. fat	Type	Services	ETI
Alice	16,000	3.6	82	1	140
Bess	20,000	4.0	85	2	461
Cora	18,000	3.5	90	4	284

Table 2. Contributions to Embryo Transfer Index by Trait for Three Sample Cows

Cow	Milk	Pct. Fat	Type	Services
Alice	1.2	.31	.67	.62
Bess	6.0	1.56	1.67	0
Cora	3.6	0	3.33	-1.25

(R.D. Shanks, Dairy Genetics)

Calendar of Events

1. Fourth Forage Institute, March 6 Moose Lodge, Vandalia, starting at 9:30. The theme will be marketing hay crops and using animal wastes on forage land. The registration fee of $8 includes lunch and a copy of the proceedings. For more information, contact Don Graffis, W-301 Turner Hall, Urbana 61801. Telephone: 217/333-4424.

2. State DHI Annual Meeting, February 28, starting at 10:30 a.m. Bob Johnson Restaurant, Bloomington. For more information, contact Gary Harpestad, 315 Animal Sciences Laboratory, Urbana 61801. Telephone: 217/333-0510.

3. Illinois-Indiana Dairy Management

Clinic, March 5 and 6, Rockford. (See details in this newsletter).

4. First Indepth Reproduction Workshop, March 18 and 19, University of Illinois, Urbana. For more details, contact Mike Hutjens, 315 Animal Sciences Laboratory, Urbana, 61801. Telephone: 217/333-2928.

5. PDCA Calf Sale, April 4, Stock Pavilion, University of Illinois, Urbana. For a catalog and details, contact Ralph Johnson, 315 Animal Sciences Laboratory, Urbana 61801. Telephone: 217/333-0636.

Review Iodine Levels in Dairy Rations

Recently at a meeting in Chicago, discussions were held about increasing levels of iodine in milk. The participants included representatives from the American Medical Association and the Food and Drug Administration, researchers, and industry personnel. Dairy producers must review management and feeding programs in order to prevent excessive iodine levels. Here are some check points.

1. Limit the amount of iodine fed to dairy cattle to 0.5 part per million (ppm) in the total dry matter of the ration (10 to 15 milligrams per cow per day).

2. Avoid several sources of added iodine such as commercial protein, trace-mineralized salt, iodized salt, commercial minerals, and packets of organic iodine (EDDI).

3. Do not use high levels of EDDI (400 to 500 milligrams) when treating lactating cows for foot rot. Limit the EDDI intake to 50 milligrams per cow per day.

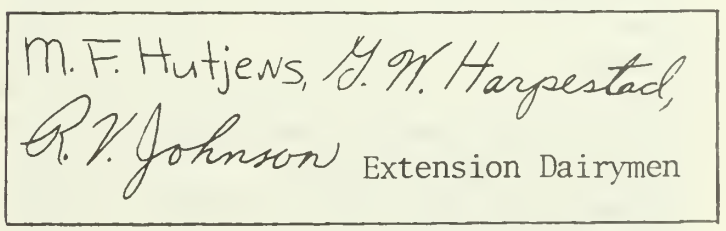
4. Use iodine sanitizers at the recommended concentrations.

5. Do not remove all dietary iodine sources. Iodine deficiencies could occur in dairy cattle.

6. Teat dips and udder washes did not contribute significant levels of iodine when the recommendations of the manufacturer are followed.

Besides higher iodine levels in milk, milk production itself can also be reduced. Cows fed 10 times the recommended levels of iodine produced from 8.4 pounds (Tennessee study) to 14 pounds (Michigan study) less milk per cow per day. Continuously feeding excessive amounts of iodine can also lower reproduction performance and increase calf mortality. Research results showed that losses were 36 percent when cows were fed excessive iodine compared to 14 percent for control cows.

Dairy producers must take action to control iodine levels in milk. Otherwise, those levels will be dictated by a governmental agency. (M.F. Hutjens, Extension Dairyman)



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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 10, Number 2 *May, 1981*

Open House

The University of Illinois and the Department of Dairy Science invite you to attend an Open House at the Lincoln Avenue Dairy Farm. The Open House will be held July 9, 1981, and will run from 9:30 a.m. to 3:00 p.m. There will be tours of the dairy facilities and a dedication of the research facilities. These facilities are supported by the Food for Century III Program and provide the Illinois dairy industry with the most up-to-date facilities and equipment necessary for their research needs and for training future students.

On the tours, visitors will have a chance to see the polygon milking parlor, which has integrated the latest automatic milking equipment, detachers, milk flow meters, and milk weight recorders; the confinement heifer facilities; the various manure handling systems; and the automated feed systems, which incorporate animal identification. Demonstrations will be given of University research on reproductive management using prostaglandin and embryo transfer, feeding brewer's grain, and mastitis control.

For further information, write or call Gene C. McCoy, 315 Animal Sciences Lab., 1207 W. Gregory Drive, Urbana, IL 61801 (phone: 217-333-2624).

Feed Passage in Dairy Cattle

Providing the correct amount and combination of nutrients needed to support optimal milk production is the goal of a sound feeding system. Important to determining the correct amount and combination is the point within the animal's digestive tract where a particular feed component is degraded. One of the most important factors that influences the point of digestion is the rate of passage of the feed component. Research on the rate of passage has been directed primarily at analyzing the factors affecting passage from the rumen since passage from this compartment determines, to a great extent, both the amount and composition of nutrients eventually absorbed by the animal.

The rate of passage of feed components from the rumen is based on the size and density of the feed particles. Chopping and grinding decrease the size of these particles and make it possible for a larger proportion of the diet to pass from the rumen. Chewing (eating and rumination) and microbial action also reduce the particle size of ingested feed.

The mean particle size (one half of the feed's weight is larger than this size while the other half is smaller) of some feeds is given in Table 1. Table 2 gives mean particle size for material

in various digestive tract sections of lactating dairy cattle.

It is apparent from these tables that feed particles must undergo considerable size reduction before passing from the rumen to the abomasum. Relatively small reductions in particle size occur as the material passes through the remainder of the digestive tract.

Table 1. Feed Mean Particle Sizes

Feed type	Length (inches)
Corn silage	.104
Ground corn mix and corn silage (60:40)	.048
Ground corn mix	.035
Chopped alfalfa hay (1 inch screen)	.031

Table 2. Digesta Mean Particle Sizes[a]

Digest site	Length (inches)
Rumen contents	.021
Abomasal contents	.010
Cecal contents	.007

[a]Mean of three animals fed hay, corn silage, and grain

Although feed intake and the rumen bypass of protein supplements and starch are influenced by particle size and density, quantitative information on the dynamics of feed passage in dairy cattle is limited. Current University of Illinois research is aimed at obtaining a greater understanding of the relationship between particle size and feed passage in dairy animals. With this added knowledge of the cow's digestive system, it will be possible to formulate rations in which the physical and chemical composition of the diet are more closely matched to a cow's nutrient requirements. (Mike Murphy, Dairy Nutrition)

Performance Test on the Nu-Pulse Milking System

The Nu-Pulse milking system has recently been marketed in the Midwest. This system is different from traditional systems in that it does not have a separate pulsation system. Instead, the pulsator vacuum is supplied from the claw. The intent is to supply an equalized vacuum on both sides of inflation, thus keeping the milking liner in contact with the teat.

An evaluation of the Nu-Pulse system was published by Dr. J. O'Shea and Dr. E. O'Callaghan, Moore Park, Ireland, in a paper titled "Experiments on milking machine components at Moore Park, 1976-79." The Nu-Pulse system was compared to a traditional milking system. The clusters of each system were fitted with Alfa Laval shells and 01 liners. Forty-eight cows were divided into two groups for twelve weeks.

The following observations were made in the researchers' evaluation. (1) The time required for milk flow to begin did not differ between treatments; there was no evidence that the Nu-Pulse system stimulated cows better. (2) The conventional clusters took less time to complete milking and for machine stripping than the Nu-Pulse clusters. (3) The Nu-Pulse system equipped with a filter gauze on the top of the claw slipped and fell more than the traditional system did. (4) Cows milked with the Nu-Pulse had a higher cell count than those milked with the traditional system. The higher cell count and the increased infections of cows milked with the Nu-Pulse system may have been related to liner slippage. (5) The Nu-Pulse system resulted in higher free fatty acid values, which reflect increased milk turbulence. (Barry Steevens, Extension Dairy Specialist, Missouri Dairy Newsletter)

Determining Forage Moisture

Most dairy producers recognize the importance of knowing the moisture level in feed, especially since optimal fermentation in storage structures, ration balancing, and feed intake all are influenced by variation in the moisture level. Several methods can be used to determine moisture level.

1. Electronic testers are commercially available for $300 to $400. Do not purchase models that involve probes (University of Minnesota researchers found moisture values determined by such models varied more than 5 percentage points from the correct value). Users must be consistent in filling the instrument, in using well-chopped material, and in keeping batteries charged.

2. Forced air commercial driers are available for $150 to $200 depending on the type of scale used. These units are slower than the electronic testers.

3. A microwave oven can rapidly and accurately determine moisture levels. Twenty-five grams (1/20 of a pound) can be dried in a home microwave oven in about 10 minutes. The average moisture level is within 2 percentage points of the standard air oven results. Larger samples or ovens with less power require longer drying times. An asbestos pad (magnetron protection) is necessary when the sample moisture is low to avoid abnormal heating, which can shorten the life of the oven. A large dish with low sides (like a plastic bacon pan) would also be satisfactory. A postage or baby scale can be used for weighing. Continue to dry the sample until a stable weight is reached.

4. A commercial lab can be used. Most labs have a turn-around time of 7 days and a charge of $2 to $5 per sample.

5. The grab method involves taking a handful of forage, squeezing it tightly, and releasing it.

Squeezed Forage Ball	Estimated Moisture
Moisture runs out	Over 70%
Remains balled up	60-70%
Slowly opens up	50-60%
Falls apart	Less than 50%

Select the method that fits your budget, time limitations, and need for accuracy. But know the moisture levels of your wet feeds. (M.F. Hutjens, Extension Dairyman)

Feeding of Wet Brewer's Grains to Lactating Dairy Cows

Considerable interest has been generated in the past few years in the feeding of wet brewer's grains (WBG) to lactating dairy cows. Dairy producers have been interested in learning how much of the grains can be incorporated into the ration of lactating cows without seriously affecting milk production.

An experiment at the University of Illinois was designed to determine this amount. Twenty lactating Holstein cows were fed total mixed ration diets of which WBG (31 percent dry matter) represented 0, 20, 30, or 40 percent of the total dry matter. The remainder of the dry matter in the diet feed was supplied by corn silage (40 percent of the dry matter) and a concentrate mix of ground corn, soybean meal, and minerals, which varied in composition to provide equal amounts of crude protein, digestible energy, calcium, and phosphorous. The feeding period was 4 weeks, and data were collected during the last two.

As the table indicates, the addition of WBG to the diet significantly lowered the dry matter intake of the cows compared with the intake under the control diet (no WBG added). However, only the milk yields of the 30 and 40 percent

diets were significantly different from the yields of the control diet. Milk fat production was not significantly affected by the addition of wet grains. On the other hand, cows receiving the WBG lost more body weight than the cows fed the control diet. (Doug Grenawalt, Gene McCoy, and Carl Davis, Dairy Nutrition)

Table 1. Results of Feeding Wet Brewer's Grain

	% WBG in Feed			
	0	20	30	40
	lbs/day			
Dry matter intake	43.3	40.0	37.6	32.6
Milk yields	56.3	55.0	53.7	48.8
Milk fat production	1.91	1.80	1.78	1.71

Somatic Cell Counts and Mastitis

Dairy herd improvement (DHI) somatic cell counting programs (SCC) are now available to a large number of dairy producers. In 1980 over 1.4 million cows per month were tested in the U.S., which reflects the strong commitment by dairy farmers to an effective mastitis control program. Using the SCC report, the farmer can monitor the herd during the year to determine when the greatest exposure and new infections occur. The somatic cell report thus helps dairy farmers to make mastitis control and management decisions, such as beginning early treatment, based on level of subclinical infection in the herd.

Studies conducted by University of Wisconsin researchers have provided the following somatic cell report interpretations based on SCC and bacterial cultures.

1. Cows with cell counts over 800,000 cells (excluding samples taken during the first or last two weeks of lactation) can be considered infected cows. A cow that has two consecutive samples with readings of over 600,000 can also be considered infected. Animals in first lactation can be considered infected if over 600,000. The table below summarizes the general relationship between udder health and SCC.

Table 1. Cow Somatic Cell Interpretation

No. of somatic cells	Udder health
Above 800,000	Infection highly probable
600,000 - 800,000	Infection probable
400,000 - 600,000	Suspect
Below 400,000	Probably uninfected

2. Effective treatment of infected cows will cause cell counts to go down.

3. First-calf heifers normally freshen without mastitis and have low cell counts (20,000 to 200,000 cells). Cell counts gradually increase as the cow becomes older.

4. A pathogenic (disease-causing) organism can be cultured in about half the milk samples with a SCC of 400,000 or more.

5. The DHI somatic cell count does not indicate which quarter or quarters are infected. These quarters can be identified by the California Mastitis Test (CMT) paddle.

6. A high percentage of the infected quarters do not show symptoms other than high cell counts. The quarters chronically affected occasionally flare up.

7. It is possible for cows with low cell counts to suddenly flare up with severe mastitis without prior warning of high cell counts. This situation may be due to an infection that has occurred since the last test.

8. The infection by pathogens is the most important factor to affect cell counts. However, other stresses increase cell counts, such as a stepped-on teat or udder injury.

Somatic cell reports can help determine the success of the mastitis management system. Dairy producers now have a management tool to measure the rate of new infections and to measure how subclinical infections affect production. The dairy farmer and the veterinarian thus can have information to help diagnose the factor or factors in herd management that cause new infections. (Ed Jaster, Dairy Management)

Flies on Pastured Cattle

Dairy producers must manage insect pests to attain maximum production. The use of regular animal sprays gives the best control of flies attacking pastured cattle. A once-a-week treatment early in the season and twice-per-week treatments in midsummer do an excellent job of controlling flies. Start spray programs when there is an average of 50 or more horn flies, 15 or more face flies, or 4 or more stable flies per animal.

The *1981 Insect Pest Management Guide for Livestock and Livestock Barns* (Circular 898) lists the current recommended pesticides approved for use with dairy cattle and in facilities. Contact your local county Extension office for a copy. Please note that the Illinois Department of Public Health has announced that it is illegal for dairy farmers to apply or store chlorinated-hydrocarbon insecticides (aldrin, chlordane, dieldrin, endrin, lindane, or heptachlor) on their farms, except for use in farm residences.
(Steve Moore III, Extension Specialist in Entomology)

Controlling Bovine Leukemia Virus

Some U.S. producers of cattle for export are interested in moving toward bovine leukemia virus-free herds. Only cattle free of the infection are admitted in some overseas markets, particularly in Europe, where test-and-slaughter eradication efforts are underway.

Research evidence indicates that the spread of bovine leukemia virus infection within a herd can be halted by segregation of the cattle into infected and uninfected groups. Retention of calves from infected cows may be desirable to preserve valuable bloodlines, but what are the risks?

--Only a few of the calves born to infected dams are infected with bovine leukemia virus at birth. In one study, none of 18 calves born to persistently infected cows showed infectious virus or antibodies at birth. Other research indicated 3 percent transmission from infected dams to newborn calves in farm herds.

--Infection of cows with bovine leukemia virus during pregnancy does not significantly increase the chances of transmission of virus to their unborn calves. Thirteen surviving calves born to 15 cows experimentally inoculated with bovine leukemia virus during pregnancy tested consistently negative during a year-long observation period. One cow aborted for other reasons, and twin calves (one born dead) produced by another cow showed weak positive reactions to agar-gel immunodiffusion tests for bovine leukemia virus infection.

--Considerable care may be required to avoid contact infections among young calves during the early postnatal period. Three of four initially virus-free calves acquired bovine leukemia virus when maintained in quarters with infected animals. None of 14 virus-free calves kept in individual pens in an isolation building developed infection.

--Colostrum from infected cows protected calves that were orally exposed to bovine leukemia virus. Six newborn virus-free calves fed colostrum that contained bovine leukemia virus-specific antibody and then orally exposed to the virus were protected against infection. The positive colostrum used in the tests was not, in itself, infectious.

--Colostral antibodies from infected cows had some protective effect when new-born virus-free calves were experimentally inoculated with virus via the skin. But in some instances, colostral antibodies only caused a prolonged repression of virus replication, with a subsequent emergence of an active infection.

Surveys indicate that bovine leukemia virus is widely distributed in the U.S. cattle population. Prevalence of infection in some herds, particularly in dairy breeds, is high. In the absence of official test-and-removal programs and indemnity payments, herd owners interested in exporting cattle may elect to move their herds gradually toward a bovine leukemia virus-free status. (Martin J. Van Der Maaten, National Animal Disease Center, Ames, Iowa)

M.F. Hutjens, G.W. Harpestad, R.V. Johnson Extension Dairymen

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ILLINOIS
DAIRY DIGEST
FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 10, Number 3 *September, 1981*

Adding Fat to Dairy Rations

Energy continues to be the limiting nutrient in many Illinois dairy rations. One reason is that few feeds are high enough in energy for ease in balancing energy. For example, protein levels average 12 to 16 percent in most dairy rations. Soybean meal, containing 44 percent protein (3 to 4 times the ration level), can be used. Energy levels in rations for high-yielding cows should contain 0.78 megacalories (Mcal) of net energy. Forages average from 0.50 to 0.70 Mcal of net energy and make up 50 to 60 percent of the total ration. Balancing energy in dairy rations continues to be a challenge.

Typical fat levels in Illinois dairy rations are 3 to 4 percent. Interest has grown in adding fat because it contains 2.25 times more energy than carbohydrates (sugar or starch), is commercially available, and because seeds with a high oil content are grown in the Midwest. Fat (ether extract) and energy levels are listed for some common dairy feeds.

The following guidelines should be used before routinely adding fat to dairy rations.

- Consider the cost. Cows that are eating a maximum of dry matter and producing high levels of milk are economical choices.

	Dry matter (100 percent)	
	Fat (percentage)	Net energy per pound (megacalorie)
Alfalfa	2.6	.55
Corn silage	2.8	.70
Shelled corn	4.6	.92
Oats	5.1	.79
Soybean meal	1.4	.90
Soybean seed	20.0	.99
Cottonseed	24.7	1.03
Sunflower seed	27.7	.86

- The maximum level of added fat is one pound per cow per day.
  5 pounds of soybeans X 20 percent fat = 1 pound of additional fat
  4 pounds of cottonseed X 25 percent fat = 1 pound of additional fat
  These fat levels may occasionally cause problems such as the cows going off feed or lowered fat content in the milk with high grain, wet, or finely chopped rations.

- Unsaturated fats (soy, corn, and fish oils, for example) have more effect on the rumen microbes and their environment than saturated fats (tallow, lard, or butterfat).

- Fat can decrease fiber digestibility and influence the pH of the rumen and the production of volatile fatty acids. Some dairy producers have reported lowered fat test with added fat.

- Since about 50 percent of milk fat is made from circulating blood lipids, fat test may increase with added fat.
- Be sure adequate calcium is fed to the cows since some dietary calcium may be bound to the fat.
- Guard against rancid fat and feeding problems.
- Added fats can settle dustiness and fine particles in grain mixtures. Cows generally prefer fat-added feeds.

The final decision to add fat to dairy cow rations depends on economics, the level of milk production, management ability, and ease of adding fat. (M.F. Hutjens, Extension Dairyman)

Fall Management of Hay Crops

Alfalfa and red clover crops to be used as hay crops in 1982 need special care in the fall of 1981. The date of the last harvest and the timing and amount of fertilizer are two key management considerations. A guide for the last harvest using conventional harvest systems is September 1 in the northern third, September 10 in the central third, and September 20 in the southern third of Illinois. An extra harvest may be taken in central and southern Illinois when the plants have entered dormancy.

Dormancy is brought on by cool weather, short days, and frost. The usual dates of fall dormancy are very late October in central Illinois and November 1 in southern Illinois. Regrowth should be no more than an inch or two after this late fall cutting. More regrowth will withdraw too much energy from the root system and make the plants more susceptible to winter injury or winter-kill.

Alfalfa or red clover that was seeded this spring needs a little extra care this fall. No late fall harvests or grazing of these new seedings should occur. The last harvest dates should be *no later* than September 1 in the northern third, September 10 in the central third, and September 20 in the southern third of Illinois.

Fertilizing after the last regular harvest in September is necessary for good survival and vigorous spring growth if adequate fertility had not been applied earlier in the year. On sandy soils, fertilize in fall and after the first harvest. On heavier soils, apply all the fertilizer at one time. Applications of fertilizer in the early spring have given slightly higher yields than a single application after the first cutting or after the last cutting. Fertilizing in the fall may also be desirable if hay production was unusually large (fertilizer needs were underestimated when fertilizer was applied in the early part of the season), or if the summer growth was weak and extra fertility might stimulate fall growth.

The rate of fertilizer is determined by yield and a soil test. If your soils are low in lime (pH below 6.5), phosphorus (P_1 tests below 40 to 50, depending on the soil type), or potassium (K tests 260 to 300, depending on the soil type), some fertilizer should be applied to bring the soil tests up to the suggested level. In addition to fertilizing to improve low soil test values, fertilizer should be applied depending on the yield just achieved or expected during the next growth period. Hay crops remove an average of 12 pounds of P_2O_5 (phosphate) and 50 pounds of K_2O (potash) per ton of dry matter. High-quality hay will remove even more nutrients. Because the figures are averages, test the soil in your fields every four years. If the soil test indicates a lack of vital nutrients, you have been underestimating the yield or quality of your crop. If your soil tests higher than the minimum suggested level, you may wish to reduce your rate of fertilization.

Alfalfa and clover use a lot of potassium.

A potassium soil test near 400 on silt loam, clay loam, and heavier soils may be desirable for top production.
(D.W. Graffis, Extension Agronomist)

Feeding Mastitic Milk to Calves

Mastitic milk is produced by cows with active mammary infections. Normally these cows have been treated in one or more quarters with an antibiotic. Mastitic milk and milk from cows treated with antibiotics for other health problems (metritis, for example) have been called "waste milk" and must be withheld from the market until no drug residues remain. Waste milk represents an economic loss and a disposal problem for dairy farmers. An alternative is to feed the mastitic waste milk to calves.

Waste milk may be fed when fresh or it may be fermented and stored for subsequent use. Milk produced three to six milkings after antibiotic treatment will ferment as easily as normal milk or colostrum. Antibiotic treatments cause milk produced from the first two milkings to ferment slowly. Normally all milk after antibiotic treatment is pooled and allowed to ferment.

The performance of calves fed mastitic milk is presented in the table below. The average gains in body weight were similar with calves fed waste milk gaining 0.71 pounds per day compared with gains from normal milk of 0.69 pounds per day. Calves fed waste milk had fewer health-related problems, such as scours. Death losses were relatively low in experiments where waste milk was fed. Calves fed waste milk could have an increased incidence of mastitis during their first lactation, but research results indicate little difference in mastitis between groups fed mastitic or control milk.

Three precautions should be taken when feeding waste milk. Delay feeding mastitic waste milk until after the first day of life for the calf because of the possible transfer of microorganisms from the gut. House female calves where they can not suckle themselves or each other at feeding time. Do not feed waste milk to calves intended for slaughter. Antibiotic residues may remain in the tissues and the clearance rates of some antibiotics in calves is unknown.
(E.H. Jaster, Dairy Management)

Weight of Calves Fed Mastitic Milk Compared With Calves on Control Diets During the Milk Feeding Period (Pennsylvania)

		Waste milk		Control milk	
Experiment number	Number of calves per treatment	Type	Average gain per day (pounds)	Type	Average gain per day (pounds)
1	13	Fresh	.84	Fermented	.88
2	8	Fresh	.95	Herd milk	.79
	15	Fresh	.88	Fermented colostrum	.75
	13	Fresh	.97	Fermented colostrum	.77
3	29	Fermented	.84	Herd milk	.95
4	15	Fermented	.29	Fermented colostrum	.28
	20	Fermented	.20	Fermented colostrum	.39

Members of Illinois 4-H Dairy Judging Teams Selected

Eight 4-H Club members have been selected as the Illinois Senior and Junior 4-H Dairy Cattle Judging Teams. The Senior team members are John Erbsen, Lanark; Kurt Kunkel, Granville; Tim Kunkel, Granville; and Brian Woker, Greenville. This team will represent Illinois in the Pennsylvania All-American Invitational Youth Dairy Cattle Judging Contest in Harrisburg, Pennsylvania, on September 21 and at the Sixtieth National 4-H Dairy Cattle Judging Contest in Madison, Wisconsin, on September 30. Ralph Johnson, Extension Dairyman, will coach this team.

Michael Hutjens, Extension Dairyman, is the coach of the Illinois Junior 4-H Dairy Cattle Judging Team. Members of this team are Linda Borhart, Huntley; Roger Fluegel, Lena; Valerie Meinert, Davis; and Tim VanAcker, Huntley. The team will compete in the Mid-South Invitational 4-H Dairy Cattle Judging Contest in Memphis, Tennessee, on September 26. (R.V. Johnson, Extension Dairyman)

Dairy Situation

Professor Robert Jacobson of Ohio State University presented an overview of the current and future milk market at the Midwest Outlook Conference held on August 13, 1981. Below are highlights of his presentation.

- Milk production in the U.S. will total 132 billion pounds in 1981, 3 percent higher than 1980. Peak production is still in the future.
- The demand for milk is relatively constant. Per capita consumption is close to 554 pounds of milk equivalent. Commercial usage has been 120 billion pounds in each of the last two years.
- Commodity Credit Corporation purchases will be 13.5 billion pounds of milk equivalent or 10 percent of the milk produced. Net government expenditures will be about $2.1 billion (a cost level that is unacceptable to the Reagan administration).
- The dairy title of the Agricultural Act of 1981 will lower minimum levels of parity (70 percent rather than 75 or 80 percent) in an effort to make price support decisions more flexible.
- In recent years, producer milk prices have increased at the rate of $1 per hundred pounds but the upward movement in milk prices has ended for some time.

The essential message in the milk price outlook for mid-1981 is that the price will remain static for the next year or two so producers should plan accordingly. (M.F. Hutjens, Extension Dairyman)

Research Update

The national dairy science meeting was held in June at Louisiana State University. Over 250 research reports were presented highlighting new or ongoing dairy research. Several topics are summarized below. For more details, contact our office and we will provide university contacts and research reports. (M.F. Hutjens, Extension Dairyman)

Grain Feeding Approaches–South Dakota

Three systems were studied of allocating grain to milk cows in a group housing system.

A. Grain fed at a constant grain:milk ratio (1 pound of grain per 3 pound of milk).

B. Grain fed at varying ratios based on

milk yield (1:2.5 when milk yield exceeded 60 pound, 1:3 when milk yield ranged from 45 to 60 pounds and 1:3.5 when milk dropped below 45 pound).

C. Grain fed at varying ratios based on days of lactation (1:2.5 from calving to 100 days after calving, 1:3 from 101 to 200 days, and 1:3.5 from 201 days to drying off).

Mature equivalent milk yield was highest in group C with similar peak milk in all groups. Persistency was greatest for groups B and C. The most grain was fed in group B and the least in group C. System C offered the greatest potential profit.

Ammoniated Hay–Indiana

Alfalfa hay was baled at 67 percent dry matter with 1.25 percent added anhydrous ammonia or at 80.5 percent dry matter without ammonia.

	Control	Ammonia-treated
Crude protein (percent)	18.8	23.8
Milk yield (pound of FCM)	45.8	45.0
Milk fat (percent)	3.70	3.81
Hay intake (percent B.W.)	1.99	2.03

The cows adapted quickly to ammoniated hay. Treating high moisture hay with ammonia prevented mold formation and did not adversely affect the performance of lactating cows.

Silage Preservatives–Wisconsin

A growth and digestion trial was conducted to measure the feed value of corn silage with and without sodium diacetate treatment at ensiling. Sodium diacetate was added at the rate of one pound per ton of freshly chopped silage. The addition of sodium diacetate at ensiling to whole plant corn silage (40 percent dry matter) did not improve the preservation quality, intake, or digestibility of the silage nutrients.

Growth Hormone–New York

Plasma growth hormone (51.5 international units per day) was injected in Holstein cows raising plasma (blood) concentrations from 7.3 to 27.0 milligrams per milliliter. Administering the growth hormone increased milk yield by 15.2 percent, milk fat by 16.8 percent, protein by 13.4 percent, and lactose by 20.9 percent, but no effect was found on dietary dry matter intake. The efficiency of milk production was improved in these short-term trials. Availability, cost, and the need for more long-term research limit the use of this material.

Heifer Management–Florida

The effect of age and problems at calving time on milk production of first lactation dairy heifers was measured in 1,023 heifers. Older heifers produced more milk than younger heifers (average age of 25.8 months ranging from 18 to 46 months). The sex of the carried calf increased milk yield by 208 pounds (2.7 percent) following the birth of a male. Problems at calving reduced milk yield as listed:

- retained placenta 526 pounds
- still birth 398 pounds
- difficult calving 381 pounds
- metritis 231 pounds

The frequency of problems at calving was slightly affected by age at calving.

Feed Efficiency–North Carolina

Feed efficiency estimates were obtained on 122 Jersey cows to correlate with selection for milk yield. Feed efficiency was defined as the ratio of fat-corrected milk to the net feed energy consumed. From the results of this study, direct selection for increased milk yield should result in more efficient cattle. Feed efficiency was negatively associated with body weight, dry matter intake, heart girth at calving, and stature. Negative selection pressure on body weight or size would give a greater response in feed efficiency.

Beta-Carotene–New Jersey

Beta-carotene is a precusor of vitamin A. Four dairy field studies were conducted to measure the effect of using 300 milligrams of beta-carotene as supplement on reproductive performance.

	Control	Supplemented
Average days open	111	99
Average inseminations per conception per cow	1.85	1.36
Average conception rate for 1st service per cow, percentage	71.9	60.8

In all studies, adequate vitamin A was supplied. Dairy cow fertility can be affected by many factors. Feeding supplemental beta-carotene could improve nutritionally related fertility problems. Further research is needed before recommendations can be made.

Mastitis–Idaho

A sample of 26,690 DHI records were studied to estimate heritability and correlation between milk yield and mastitis using California Mastitis Test scores. No significant relationship was found between milk production and the mastitis score. The heritability of mastitis scores was 0.11 overall (compared with 0.33 for milk yield).

M.F. Hutjens, G.W. Harpestad, R.V. Johnson Extension Dairymen

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 10, Number 4 *December, 1981*

1982 Area Dairy Days– Meeting the '82 Squeeze

Mark your calendar now and plan to attend the 1982 Illinois Area Dairy Day nearest you. The dates and locations are listed below.

January 11	Kankakee, Redwood Inn
January 12	Marengo, Cloven Hoof Restaurant
January 13	Freeport, Masonic Temple
January 13	Elizabeth, Community Building
January 14	Sterling, Emerald Hill Country Club
January 15	Peoria, Heritage House
January 19	Quincy, County Farm Bureau Building
January 20	Breese, American Legion Hall
January 21	Effingham, Extension Center

A new meeting format will be featured this year with an information-packed program starting at 10:30 a.m. No DHI business meetings will be held. The theme of this year's program is "Meeting the '82 Squeeze." The schedule is given below:

10:15	Registration
10:30	Opportunities for Genetic Improvement
11:15	Reproductive Management of the High Producing Herd
12:00	Lunch (Dutch treat)
1:00	A B C's of Minerals: Availability, Balance, and Cost
1:45	Is There a Computer in Your Future?

Commercial displays will be featured at the Freeport, Sterling, Effingham, and Breese meetings. Come early to see the latest in agri-business and service areas. A registration fee of $3 includes the 1982 Dairy Report. At Elizabeth, the program will be switched around so that the afternoon's events, featuring the speakers from Freeport, will be held in the morning.

With milk prices remaining static and costs increasing, this program will provide helpful alternatives and possibilities. (M.F. Hutjens, Extension Dairyman)

The 1982 Illinois Dairy Seminar

Milk marketing, price support, and alternatives for the dairy producer will highlight the 1982 Illinois Dairy Seminar sponsored by the Illinois Milk Producers' Association, the Department of Dairy Science, and the Agriculture Extension Service. The noon-to-noon program is scheduled for January 4 and 5, 1982, at the Regency Continental Hotel

in Peoria. Gene Meyer, Editor of *Hoard's Dairyman* magazine, will be the keynote conference speaker. Topics will also include USDA dairy policy outlook, marketing strategies, Illinois dairy producers' decisions and plans, and animal welfare. For more details and registration forms, contact John Campen, Illinois Milk Producers Association, 1701 Towanda Avenue, Bloomington, Illinois 61701, or call (309) 557-3251. (M.F. Hutjens, Extension Dairyman)

Cystic Ovaries and Stress

The occurrence of cystic ovaries in cows continues to worry Illinois dairy producers because it results in delayed rebreeding, in the culling of genetically superior cows, and in long calving intervals. A summary of 40 years' information collected from the research herd at the University of Wisconsin contains several interesting points:

- The incidence of cystic ovaries varied with the breed of cattle:

Breed	Percentage of cystic ovaries
Brown Swiss	1
Ayrshire	3
Jersey	3.2
Guernsey	4
Holstein	5.2

- No seasonal effect was found. The greatest incidence of cystic ovaries occurred in the winter, but the number of fresh cows also peaked during this same period.

- Cystic ovaries increased with the number of calvings (being lowest in first calf heifers) and leveled off at 6.4 percent when the cows had calved five or more times.

- Cows that were treated for milk fever averaged 20 percent cystic ovaries while control cows (with no milk fever) averaged 4 percent.

- The incidence of cystic ovaries increased from 5.1 to 6.6 percent when cows did not clean (retained placenta).

- Metritis increased the problem from 5.4 to 10.4 percent.

- Twinning caused cystic ovaries in 12.7 percent cows, whereas single births resulted in 4.9 percent cows being affected. When twin calves were both female, the occurrence of cystic ovaries increased to 24.2 percent.

The research summary clearly indicates that lowering stress and metabolic disorders is one way to lower the incidence of cystic ovaries. Wisconsin researchers are also examining hormonal interactions to determine other causes of this problem. (M.F. Hutjens, Extension Dairyman)

Keep an Eye on Milk-Replacer Tags

As feed ingredient prices change and shift, new milk-replacer formulations are appearing. An all-milk replacer costs or saves $45 per percentage point depending on the increase or decrease of protein, while fat costs are $5 to $6 per point per ton. Research results clearly point out marked decreases in calf growth and feed efficiencies with lower protein levels. High fat levels had little beneficial effect (in average daily gain or health scores) when the 10 percent fat product was compared to the 20 percent fat product. Check your tags against these guidelines:

Crude protein:	20 percent (all milk products)
	22 percent (some plant protein)
Fat:	10 percent minimum
Crude fiber:	Less than 0.5 percent

Added vitamins and antibiotics are also recommended. Higher fat levels (20 percent) may be beneficial when calves are stressed or exposed to disease.

Calves can be weaned when calf starter intake is up to 1-1½ pounds per day. Calf starter rations for early weaned calves should contain 18 to 20 percent crude protein for optimal growth. Canadian field studies indicated that higher levels of ration protein resulted in taller, not just heavier, calves. This size advantage (of height measured at the wither) continued as the heifers grew older.

Do not shortchange young replacement heifers in nutrients. Death losses and poor growth are real losses.
(M.F. Hutjens, Extension Dairyman)

Teat Dips in Mastitis Control

Disinfecting teat ends after milking to help prevent mastitis was first considered in 1916. The practice was not widely accepted for many years because the germicides used were only marginally effective. In the mid 1960s renewed interest in the use of teat dips as part of a total hygiene program to prevent new intramammary infections was investigated in field trials. These trials used individual paper towels for udder-washing; people wore gloves that they disinfected between milkings; teat cups were disinfected; and teats were dipped in a disinfectant solution after milking. These methods were effective, but proved to be too time-consuming to gain widespread acceptance by dairymen. Dipping teats alone reduced the number of new infections by 50 percent for most gram-positive organisms (Staph. and Strep.).

Most of the early work in the 1960s with teat disinfectants utilized solutions of 4 percent sodium hypochlorite or 1 percent iodophor compounds. As the practice of teat-dipping increased, the number and type of products increased. The types of products that have been used are listed in Table 1. Recently, an acrylic latex preparation has been developed that serves as a mechanical barrier or teat cover to reduce gram-negative infections (coliforms).

Table 1. Compounds Used for Teat-End Disinfection

Compound	Concentration (%)
Iodophors	0.25 to 1
Polyvinylpyrrlidone iodine	0.5 to 1
Hypochlorite	4 to 5
Bromine	0.2
Iodine in oil	0.5 to 1
Chlorhexidine	0.5
Chlorine dioxide	.04 to 0.2
Na dichloro-S-triazene-trione	0.3 to 1
Hexachlorophene	1
Diaphen	1
Cetylpridinium chloride	0.1 to 0.2
Ammonium chloride	0.5
8-Hydroxyquinoline sulfate	0.1

SOURCE: Farnsworth, University of Minnesota

Teat-end irritation can be a problem when using a teat disinfectant and may be reduced by using emollient products such as glycerine or lanolin. These emollients are most effective at concentrations of 2 to 4 percent but oil-based products are ineffective in preventing intramammary infections and are not presently used in commercial teat dips. The method of applying the teat dip may also affect the efficacy of the practice. The spraying of teat ends has reduced the rate of new intramammary infections by 45 percent. However, when used by hurried milkers, spraying may result in only partly covering the teat end with the sanitizing agent. Below are management tips on using teat dips:

1. Read carefully the directions on the containers for use and application of the teat dip for maximum efficacy and reduced teat irritation. Do not use iodine-based sanitizers.

2. Iodophor products with low pH tend to irritate teats, but additions of emollients reduce the problem.

3. The freezing of a teat dip and its use later may cause irritation of teat ends.

4. Watch for teat-end lesions when beginning teat dipping or changing types of dips, and discontinue use when irritation is noticed.

(E.H. Jaster, Dairy Scientist)

Challenge Feeding–Is It Needed?

Getting high-producing cows shifted from a dry ration to a high energy ration continues to limit milk production and peak milk. If this shifting is not done correctly, ketosis, acidosis, off-feed, and low dry matter intake occurs. Challenge feeding has been defined as the rapid increasing of grain intake after calving to support the nutrient needs of high producing cows.

Researchers from Washington State University completed a series of studies to determine the effect that the time taken and the system used to reach maximum grain intake had on milk yield. First calf heifers were used to study the effect that four different times after calving had on milk, fat, and body weight changes (Table 2).

The first time period (3 to 4 weeks) was experimentally designed to be less than 2 weeks, but the heifers refused to increase grain intake fast enough.

In a second study, groups of cows were offered free choice grain, restricted grain, or restricted grain for 4 weeks followed by free choice grain after calving (Table 3).

Table 3. Response of Cows to Varied Grain Feeding Schemes (Postpartum)

	Restricted	Free-choice	Restricted and free choice
Milk yield (lb.)	66.0	73.5	74.7
Fat test (%)	3.1	2.6	2.8
3.5 fat corrected milk (lb.)	60.9	62.7	65.6
Hay intake (lb.)	23.7	10.8	13.6
Grain intake (lb.)	15.4	34.3	31.0
D.M. intake (lb.)	39.1	45.1	44.6
Peak grain intake (week)	No peak	14	10
Peak milk (week)	5	7	9

Two conclusions can be drawn from the research report. A high forage, high protein diet with 20 pounds of grain may be optimal for the first four weeks postpartum in terms of milk yield, health aspects, peak milk, and grain costs. A savings of $500 in lower grain purchases occurred in the restricted-followed-by-free-choice diet compared with the free-choice system. Second, challenge feeding needs a new definition. Challenge feeding can be defined as the feeding of maximum nutrients to the cow for milk production postpartum, not the maximum amount of grain. This new definition involves total dry matter intake, digestibility, rate of passage, optimal

Table 2. Relationship of Milk Yield and Body Weight to the Time Taken to Reach Maximum Grain Intake (36 lb.)

	Postpartum time (weeks)			
	3 to 4	4 to 5	6	16
Average milk yield (lb.)	63	64	57	53
Fat test (%)	3.37	3.18	3.32	3.70
Body weight (lb.)	+26	-78	-3	-164

rumen fermentation, and optimal nutrients available for absorption.
(M.F. Hutjens, Extension Dairyman)

Harold McAvoy Retires

On October 1, 1981, Harold E. McAvoy, Chief of the Division of Milk Control, Illinois Department of Public Health, retired after 38 years with the Department. Upon Mr. McAvoy's retirement, the Division of Milk Control and the Division of Food and Drugs were merged into a single division titled the Division of Food, Drugs and Dairies. Dr. Roy W. Upham, Chief of the former Division of Food and Drugs, is the new Division Chief, and Mr. Lewis W. Schultz, formerly Assistant Chief of the Division of Milk Control, is in charge of the Dairies Section.

The restructuring is intended to maximize personnel utilization, increase management efficiency, and to better utilize restricted budgetary funds. Communication may be directed to:

Dr. Roy W. Upham, Chief
Division of Food, Drugs and Dairies
(217-782-2015)

or

Lewis W. Schultz, Dairies Section
(217-785-2439)

both at

Division of Food, Drugs and Dairies
Illinois Department of Public Health
535 West Jefferson Street
Springfield, IL 62761

Time to Renew

This issue is the last Dairy Digest for 1981. We hope the four issues have been informative and we look forward to you as a 1982 subscriber. Your renewal form will arrive soon. Fill it out and return it promptly to avoid missing our next issue. The price will be the same as last year ($4.00). Any suggestions that will make the dairy newsletter bigger and better in 1982 are always welcome.
(M.F. Hutjens, Extension Dairyman)

M.F. Hutjens, G.W. Harpestad, R.V. Johnson Extension Dairymen

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ILLINOIS DAIRY DIGEST

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The Effect of the Milking Vacuum System on Udder Health

Milking systems are designed to milk cows efficiently and to keep udders healthy. The vacuum supply system used in milking consists of a pump that creates a vacuum at the end of a teat, causing milk to flow; it also supplies the energy to activate the liner and massage the teat, and it moves the milk through the system. Research has indicated that intramammary infections can occur during milking, infections that can be attributed to the propulsion by machine action of mastitic pathogens through the teat streak canal. Fluctuations of the milking vacuum may force milk droplets back into the streak canal during milking and lead to the transfer of mastitic organisms. Research has also shown that the milking machine can affect the keratin formation on the inside of the streak canal. Keratin is important because it protects the teat from mastitic pathogens and reduces the cow's susceptibility to intramammary infections.

Recently, researchers at the University of Kentucky determined by several methods the effects that milking vacuums of 10.2, 12.75, and 15.3 inches had on udder health. The methods included percent of quarter-samples positive for *Staphylococcus aureus*, total counts of bacteria on blood agar, teat end scores, the California Mastitis Test (CMT), and direct microscopic somatic cell count. The rate of infection was higher with the 15.3-inch vacuum than with 10.2- or 12.75-inch ones. Samples from cows

Table 1. The Relationship of the Milking Vacuum System to Infection[a]

Milking vacuum	Number of quarters	Counts				
		Total bacteria[b]	Staphylococci[b]	DMSCC	CMT[c]	Teat end scores[d]
10.2	296	771	207	244,000	0.56	1.26
12.75	276	723	264	199,000	0.34	1.57
15.3	264	1,667	732	383,000	1.45	1.90

[a]Relationship specifically to staphylococci counts, a direct microscopic somatic cell count (DMSCC), California Mastitis Test (CMT) and teat end scores of first calf heifers during their first lactation.
[b]Colony forming unit per milliliter of milk.
[c]Zero = negative, 1 = trace to weak positive, 2 = distinct positive, 3 = strong positive.
[d]1 = normal, 2 = slight cracks, 3 = deep cracks, 4 = cracks and eversions.

milked with 12.75-inch vacuums had a lower percentage of samples positive for *Staphylococcus aureus*, a lower total count, a lower California Mastitis test, and a lower direct microscopic somatic cell count than samples from cows milked with 10.2 inches of vacuum. Teat end scores increased with the increase in milking vacuum. Approximately 49 percent of the samples from cows milked with 15.3 inches were positive for *Staphylococcus aureus* compared with 19.9 and 16.7 percent of the samples for 10.2 and 12.75 inches. The milking vacuum of 15.3 inches infected the highest percentage of cows with three (44.5 percent) and four (24.1 percent) quarters positive for *Staphylococcus aureus* (Table 1).

Research indicates that if *Staphylococcus aureus* is the prevalent microorganism causing mastitis, a milking vacuum of 15.3 inches could increase mastitis in a herd. (E.H. Jaster, Dairy Management.)

Hay Prices Skyrocket

Don't be lulled into false security about hay as cattle feed! While grain is an economical nutrient source, making the milk-to-grain ratio favorable, hay is altogether different. When dairy producers report paying from $4 a bale to $120 a ton, they must ask themselves: Is hay really worth these prices?

Table 2 compares the value of various feeds using feed evaluation factors with corn (energy source) and soybean meal (protein source). The prices used to calculate feed values were $100 a ton for shelled corn and $200 a ton for soybean meal. Multiply the price of corn by the energy constant and the price of soybean meal by the protein constant and add the two values. Subtract if the protein constant is negative. If you can purchase the feed for less than this value, it's a good buy.

Table 2. Evaluation of Feeds

Feed	Constant		
	Energy (corn)	Protein (soybean meal)	Value of feed ($/ton)
Alfalfa hay, low quality	0.263	0.153	56.90
Alfalfa hay, average quality	0.296	0.212	72.00
Alfalfa hay, high quality	0.296	0.259	81.40
Bromegrass hay, average quality	0.415	0.060	53.50
Oat straw	0.326	-0.035	25.60
Corn silage	0.265	-0.011	24.40
Beet pulp	0.931	-0.051	82.90
Ear corn	0.918	-0.018	88.20
Oats	0.806	-0.095	61.60
Brewers' grain	0.374	0.464	130.20

Besides price, consider minimum fiber levels (17 percent crude fiber) and physical fiber form when replacing hay in the feeding program. Buffers can minimize acidosis when higher levels of grain are fed. (M.F. Hutjens, Extension Dairyman.)

How Illinois Dairy Farmers View Government and the Dairy Business

The Agriculture and Food Act of 1981 took a long time to evolve partly because of the protracted debate among dairy producer groups, consumer groups, and members of Congress on what the future program for dairy price support should be.

To find out how Illinois dairy farmers viewed government programs, a mail survey was conducted in November and December, 1981, by the Cooperative Extension Service at the University of Illinois in cooperation with the Illinois Milk Producers Association. By knowing where most farmers stand on certain issues, milk producers and cooperative groups can plan future legislative and marketing strategies for their mutual benefit.

The Illinois Cooperative Crop Reporting Service assisted in the survey by drawing a sample of 940 dairy farmers from all dairy farmers in the state. The data reported here came from 330 usable questionnaires that were returned.

How will dairy farmers react to the government maintaining the support price at $13.10?

If the support level is maintained at $13.10, most producers will make no change in the following numbers: cows in their herd, heifers raised for replacement, cows culled from the herd, the amount of grain and concentrate fed in the dairy cow's ration, and the money spent on improvements of buildings and equipment for the dairy herd. As a result, the production of milk in 1982

Table 3. Dairy Farmers' Responses to Retaining the 1982 Support Price at $13.10

Proposed measure	Responses			
	Increase	Decrease	No change	No answer
	Percent			
Number of cows in herd	22	9	68	1
Number of heifers raised as replacement	22	8	68	2
Number of cows culled	34	4	60	2
Amount of grain and concentrate fed to cows	12	7	78	3
Money spent for buildings and equipment	14	31	52	3

Table 4. Dairy Farmers' Reponses to Various Support Programs

Proposed measure	Responses			
	For	Against	Undecided	No answer
	Percent			
a. Keep the old program--minimum support of 80% of parity through government purchases.	48	27	20	5
b. Base the milk support price on the average cost of production; have government buy manufactured products to keep price at average cost.	39	30	25	6
c. Make direct government payments to dairy farmers whenever average milk price falls below the cost of production but have no government purchases of dairy products.	14	60	21	5
d. Give each farmer a production base or market quota, then cut price or levy other penalty on any overproduction.	16	68	11	5
e. Eliminate all government support price efforts. Let cooperatives negotiate with milk processors and handlers for the price to producers.	33	37	27	3
f. Offer dairy farmers a direct payment for each cow culled from their herds.	37	43	15	5

could stay the same or increase slightly above that of 1981. The responses from the survey are given in Table 3.

Would dairymen favor other support programs?

The specific proposals and dairymen's responses are listed in Table 4.

Do dairymen want federal orders?

When asked if they wanted to see federal milk marketing orders continued, 57 percent were in favor, 9 percent opposed, and 34 percent were undecided or did not answer.

Where do dairymen stand on foreign trade policy for dairy products?

Among those responding, 83 percent would sell to Russia all the butter and other dairy products it wants to buy. However, on imports of dairy products, only 12 percent wanted to keep imports at present levels, 36 percent wanted to reduce imports, 44 percent opposed any imports, and 8 percent were not sure or did not answer. The responses of dairy farmers to the import of casein are listed in Table 5.

Table 5. Responses to the Import of Casein

Policy	Percent
Continue to allow unrestricted imports as at present	3
Reduce imports and begin domestic production to meet demand	40
Stop imports; produce all we need in the U.S.	50
Not sure	6
No answer	1

How do dairymen view the promotion of dairy products?

The majority of respondents are definitely not satisfied with present efforts to promote dairy products. Only 22 percent said they were satisfied; 65 percent were not, and 13 percent were not sure or did not answer. However, more than half reported that they were participating in an automatic or voluntary checkoff to help finance promotion efforts. Their responses are tabulated in Table 6.

Respondents were also asked how much they would be willing to pay to help promote the sale of dairy products. Their responses are summarized in Table 7.

Table 6. Participation in Checkoff for Promotion of Dairy Products

Method	Percent
Automatic or voluntary checkoff	62
Not participating	19
Don't know	13
Other	3
No answer	3

Table 7. Willingness to Contribute to Promotion of Dairy Products

Amount per 100 lbs. (in cents)	Percent
20	5
15	4
12-1/2	2
10	17
7-1/2	5
5	25
2-1/2	25
Nothing	13
No answer	4

Many dairy cooperative and industry leaders feel these amounts are too low in view of the current milk prices, the amount of oversupply, and the percentage of sales by producers of other competing beverages.

Do dairymen favor political activity by dairy cooperatives?

Dairymen definitely favor sponsoring political action committees, with 67 percent favoring either voluntary or required contributions. Only 19 percent said they did not feel dairy cooperatives should participate in political activity, while 14 percent were not sure or did not answer.

What were some of the personal characteristics of the respondents?

The average or typical respondent to the survey was a high school graduate, 48 years old, who had 54 cows in his herd, farmed an average of 350 acres, and was a member of the Farm Bureau and a dairy cooperative. About 47 percent were members of a dairy herd improvement association in 1981.
(Harold D. Guither, Extension Economist, Public Policy.)

Reproductive Management Workshop Scheduled

Reproductive management is challenging: it can spell the difference between profit and loss, dictate genetic improvement, and influence herd health. To meet this challenge, a two-day in-depth workshop is scheduled at the University of Illinois on March 16 and 17, 1982. A combination of discussions and laboratories are planned to provide hands-on experiences, visual observations, and live in-cow palpation. Groups will be small enough to provide maximum time for learning and problem solving. Optional programs will be available, tailored to each participant's needs and interests. This is a repeat of last year's highly successful workshop. There are a limited number of openings left for this year's workshop. A registration fee of $25 per farm covers handouts, reproductive tracts, and milk breaks. For registration and program details, contact the Dairy Extension Office, 315 Animal Science Laboratory, 1207 W. Gregory Drive, Urbana, Illinois 61801.

New Publications

Subscribers to the Illinois-Iowa Dairy Handbook will be receiving three new guidesheets.

- The Feeding of Wet Brewery By-Products to Lactating Cows. Guide 204.
- Silage Production for Dairy Cattle. Guide 205.
- Complete Rations for Lactating Cows. Guide 206.

Also available is a new four-page sheet entitled "Feeding Soybeans to Dairy Cattle."

Because of snow and cold weather some dairy producers could not attend the 1982 Area Dairy Days. Copies of the 34-page "1982 Illinois Dairy Report," highlighting dairy-day talks and new dairy research at the University of Illinois, are available for two dollars.

These publications plus the Illinois-Iowa Dairy Handbooks are available through the Dairy Extension Office, 315 Animal Sciences Laboratory, 1207 W. Gregory Drive, Urbana, Illinois 61801. (M.F. Hutjens, Extension Dairyman.)

M.F. Hutjens, G.W. Harpestad, R.V. Johnson Extension Dairymen

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 11, Number 2 *March, 1982*

Imitation Cheese–A Challenge to the Dairy Industry

With a 10 percent excess in milk production facing the U.S. dairy industry, another dark cloud appears on the horizon. Imitation cheese is rapidly gaining popularity and thus threatening the real cheese market. In 1978, two percent of the cheese sold in the United States was imitation, while in 1980, imitation cheese had captured five percent of the market.

Two types of imitation cheese can be produced. Partially (filled) imitation cheeses are made with vegetable fat replacing milk fat in combination with nonfat milk solids. Complete (analog) imitation cheeses use vegetable fat and imported casein or nondairy proteins to replace nonfat milk. Casein, a milk protein, is not produced in the United States, and no domestic milk solids are being used to produce imitation cheeses. New Zealand, Ireland, and Australia produced 51, 16, and 12 percent, respectively, of 1980 U.S. casein imports.

Economic factors play a key role in influencing market shifts. The competitive prices of imitation cheeses have hurt the sale of real cheeses. A 1981 University of Wisconsin survey illustrates the point in its findings that:

- Pizza made with imitation cheese cost 10.3¢ per ounce compared with 13¢ per ounce for pizza made with natural cheese.
- Imitation cheddar cheese cost $2.04 per pound while natural cheddar cost $2.50 per pound.
- Forty-two percent of the frozen pizzas marketed in Illinois contained imitation cheese.
- An average of 36 percent of shelf space nationwide was devoted to frozen pizzas containing imitation cheese.

Because of foreign government subsidies, imported casein costs $1.30 to $1.50 per pound, which is 40 percent less than the cost of U.S. milk proteins. If imitation cheeses were replaced by cheese in government storage, 57 percent of government stored cheese would be utilized. Currently, about 199 million pounds of cheese are in government storage, representing a three-month supply.

Strategies for the dairy industry to meet the imitation cheese challenge should include aggressive promotion and advertising, wide use of the Real Seal Program (a symbol associated with dairy products), and labeling requirements to identify imitation cheese. (M.F. Hutjens, Extension Dairyman)

Teat Cup Liner Closure and Mastitis

Mastitis-causing bacteria generally enter the udder through the teat end and move into the streak canal. Proper milking machine performance affects the rate of new mastitis infections. The milking machine performs two basic functions: (1) it imposes a controlled vacuum on the teat to open the teat orifice and provide the differential pressure (suction) necessary for milk flow, and (2) its pulsator controls liner action (the liner massages the teat intermittently to stimulate it and prevent blood congestion).

Research has found that stopping pulsation of the liner in a conventional double-chambered teat cup increases the rate of new infections. Recent experiments have determined that the duration of liner closure (the amount of time the liner was more than half closed) per pulsation cycle affects new infection rate under high bacterial conditions. Four durations of liner closure were studied: 0, 0.17, 0.34, and 0.51 seconds per pulsation cycle. Ten dairy cows were exposed to bacteria before and after each milking by dipping all teats in a suspension of *Streptococcus agalactiae* and *Streptococcus dysgalactiae*. Infection results appear in the table in column two.

Effect of Duration of Liner Closure on Mastitis[a]

Liner more that half closed (seconds)	Ratio of infected to total number of quarters	Proportion of cows infected
0	20/40	0.90
0.17	11/40	0.70
0.34	4/40	0.40
0.51	5/39	0.40

[a]National Institute for Research in Dairying, J. Dairy Sci. 64(11):22-40. 1981.

For the latter three treatments in the table, the duration of the liner more than half open was 0.66 seconds per pulsation cycle, resulting in pulsation rates of 72.3, 60.0 and 51.3 per minute. The two treatments with longer durations of liner closure (0.34 and 0.51 seconds) approximately cover the range for wide-to-narrow pulsation ratios commonly supplied to milking systems. These results provided evidence that a closure time of one-third of a second or more per pulsation cycle reduces the risk of new mammary gland infections.

In summary:

1. The occurrence of new quarter infections increases with a decrease of liner closure. A liner closure duration of one-third of a second appears desirable to reduce mastitis.
2. Rear quarters were infected more readily than front quarters when reducing duration of liner closure.
3. Teat end diameter responses may help to explain why the occurrence of infection differed among quarters and among cows. (E.H. Jaster, Dairy Management)

Summit Milk Yield–A New Management Aid

Starting in January, 1982, Illinois dairy producers will have a new criterion to measure their herd production goals: "summit milk yield." This yield is the average of the highest two test milk weights of a cow measured on the first three DHI sample days. For example, if the first three monthly milk weights were 77, 81, and 74 pounds, summit milk yield for that cow would be 79 pounds. As with the use of peak milk, the major use of summit milk yield is to evaluate management and predict the expected total lactation yield of cows. The following table illustrates general relationships between summit milk yield and expected herd average. Summit milk was selected

Summit milk yield (lb.)		Expected herd average (lb./lactation)
1st lactation	2nd and later lactations	
30.2	44.1	10,000
48.8	61.4	14,000
57.9	70.2	16,000
67.2	78.9	18,000
76.2	87.6	20,000

because one single milk weight (peak milk) can be affected by mastitis, estrus (cows in heat), off-feed, and other environmental factors.

The summit milk values will be printed in the "Avg. Peak Lb. Milk" box on the feeding summary section of the DHIA-202 Herd Summary Report even though the numbers represent average summit milk yield rather than average peak pounds of milk. The box labels will be changed when forms are reordered. (M.F. Hutjens, Extension Dairyman)

Control of Coliform Mastitis

"Coliform" is a general term for fermentative gram-negative bacteria of the family Enterobacteriaceae, which inhabit the intestinal tract of man and other animals normally without causing disease. Coliform mastitis in the dairy cow is caused by these gram-negative bacteria, specifically the lactose fermenters *E. coli, Klebsiella, Enterobacter aerogenes* or *cloacae,* and *Citrobacter.*

Coliform mastitis occurs commonly after calving but may develop at any time during lactation. The infection may be severe and usually appears suddenly; for example, the cow may appear normal at one milking and at the next milking show pronounced signs of illness, including lack of appetite, fever to 106° F., depression, shivering, and rumen stasis. Inflammation may be minimal at the onset of a coliform infection, and swelling may be detected only after the udder has been thoroughly milked. Later, the quarter is swollen and hard, and the teat may be thickened, swollen, and sensitive. If allowed to progress, coliform will lead to endotoxic shock; the cow will be afflicted with depression, dehydration, and diarrhea. It has been estimated that among cows with severe coliform (peracute coliform) mastitis, 10 percent died, 70 percent stopped milking, and 20 percent returned to milk.

Mastitis control programs based on teat dipping and dry cow therapy are highly effective in controlling staphylococcal and streptococcal mastitis but have little effect on coliform infections. Teat dips have failed to prevent new coliform infections, with the possible

exception of the acrylic latex teat dips, which provide a seal on teat ends after milking. In general, though, control methods to reduce coliform mastitis in field trials have not been highly successful. The recommendations summarized below are probably valid, but their usefulness needs to be examined under controlled studies.

1. Change to an alternate bedding material when trying to halt an outbreak of coliform mastitis. Bedding materials, especially sawdust, are a source of coliform bacteria.
2. Increase the space alloted per cow, keep stalls clean, and reduce the amount of time the cow occupies the stall.
3. Dry udders and teats completely; avoid milking cows with wet udders.
4. Pay attention to milking machine sanitation and milking procedures. Sanitation will prevent the machines from becoming reservoirs for coliform bacteria. Improper machine procedures may transmit bacteria through the teat canal and increase coliform mastitis. (E.H. Jaster, Dairy Management)

Pricing Wheat Silage

Participation in the 1982 acreage reduction program may allow winter wheat to be harvested as silage up to the soft dough stage. Be sure to harvest in the boot stage for top quality forage for milk cows.

Using Morrison feed constants, the price of small grain forage (56% TDN, 12% crude protein) is calculated below as an example:

- Energy value: .163 (energy constant) X $100 (value of 1 ton of shelled corn = $16.30
- Protein value: .017 (protein constant) X $200 (value of 1 ton of soybean meal) = $3.40
- Value of wheat silage: $16.30 + $3.40 = $19.70 (one ton, 26 percent dry matter)

Adjust your prices to reflect current shelled corn and soybean meal prices, forage quality, and harvesting costs ($3 to $5 per ton to chop, transport, and store). (M.F. Hutjens, Extension Dairyman)

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 11, Number 4 *December, 1982*

1983 Area Dairy Days–Economics and Efficiency: The Dairy Solution

Mark your calendar now and plan to attend the 1983 Illinois Area Dairy Day nearest you. The dates and locations are listed below.

January 10	Kankakee, Redwood Inn
January 11	Marengo, Shady Lane Restaurant
January 12	Freeport, Masonic Temple
January 12	Elizabeth, Community Building
January 13	Sterling, Emerald Hill Country Club
January 14	Peoria, Extension Office
January 18	Quincy, Farm Bureau Building
January 19	Breese, American Legion Hall
January 20	Effingham, Extension Center

The meeting, consisting of an information-packed program, will start at 10:30 a.m. The theme of this year's program is "Economics and Efficiency: The Dairy Solution." The problem of static milk prices and increasing costs will be examined, and various alternatives considered. The schedule is given below:

10:15 a.m.	Registration
10:30 a.m.	Energy: First Limiting Nutrient
11:30 a.m.	Lunch (Dutch treat) Viewing Commercial Displays
1:00 p.m.	Managing Your Milking System
1:45 p.m.	Meeting the 1983 Dairy Price Squeeze
2:30 p.m.	Questions and Discussion

Commercial displays will be featured at the Freeport, Sterling, Effingham, Peoria, and Breese meetings. Come early to see the latest in agribusiness and available services. A registration fee of $3 includes the 1983 Dairy Report. At Elizabeth, the program will be switched around so that the afternoon's events, featuring the speakers from Freeport, will be held in the morning. Forage production will be discussed at Breese, Effingham, and Peoria. (M.F. Hutjens, Extension Dairyman)

Cows Indexes Provide Guide for Genetic Improvement

In any program for the genetic improvement of a herd, two requirements are basic: (1) identification of each cow by her sire, dam, and date of birth; and (2) the checking of each animal's performance records.

An estimate of a cow's genetic ability to transmit high production to her offspring is essential for selecting and evaluating cows. The USDA-DHIA Cow Index is the best known and most widely used estimate of a cow's transmitting ability. The index is based on production records of the cow, along with input from her sire's predicted difference and her dam's cow index. If the dam's cow index is not available, the predicted difference of her sire is used when the sire can be identified through the use of pedigree files.

Lists of cows with high indexes are extensively used by artificial insemination organizations to locate cows for special matings to obtain bull calves that may be used as future sires. Dairy producers also use cow indexes to identify superior cows that may be considered for embryo transfers.

Cow indexes are calculated twice a year as a part of the USDA-DHIA Sire Summary Program. Owners of registered cows that qualify for inclusion on an "Elite" cow index list receive a report of these indexes by mail.

The minimum cow index dollar (CI$) and the percentage of eligible, registered cows of each breed qualifying for the "Elite" list in July, 1982, are listed below:

Breed	Minimum CI$	Percentage of "Elite" Cows
Ayrshire	124	3.2
Guernsey	136	3.1
Holstein	181	1.2
Jersey	158	2.0
Brown Swiss	159	3.3
Milking Shorthorn	160	4.7

A listing of all registered and grade cows in Illinois with indexes of +$100 or higher is on file in the Dairy Science Extension Office. To get a report of any cows in your herd that are included in this listing, send your herd code number to R.V. Johnson, 315 Animal Sciences Laboratory, 1207 W. Gregory Drive, Urbana, IL 61801.

Many Illinois herds have genetically superior cows. In July, 1982 Illinois had about 8,460 cows of all breeds with indexes of +$100 or higher. They account for nearly 28 percent of all high-index cows in the nine states in the Mid-States area.

Cow indexes are also calculated for all registered and grade cows. A listing of these indexes is available from the Mid-States Dairy Records Processing Center for a charge of $5.00 per herd each time a list is prepared. Dairy managers who have not previously requested these reports on a regular basis can order cow index lists that will be calculated in January, 1983, by attaching a note to the DHI Barn Sheet. This note must be received at the records processing center by February 20, 1983. When ordering, please specify the DHI code number and indicate whether you want the January, 1983, list only or a listing twice a year on a regular basis. Do not send any money with the note; the cost will be billed to the local DHIA. (R.V. Johnson, Extension Dairyman)

Stability of Beta Carotene in Forage

Beta carotene is a fat soluble substance found in feeds that is converted to vitamin A. German researchers have reported that beta carotene can improve reproductive performance in dairy cattle (by causing more intensive heat expression, fewer inseminations per conception, and lower levels of cystic ovaries).

University of Wisconsin researchers have measured the stability of beta carotene in hay and haylage over time (Table 1).

Table 1. Amount of beta carotene remaining in stored forages (hay or haylage)

Time in storage	Hay	Haylage
	Percent remaining	
80 days	45	45
160 days	20	45
365 days	0	40

Beta carotene is not stable in storage and breaks down completely when stored as hay over time. Haylage levels remain constant after initial losses. Adequate beta carotene levels are found in freshly cut forage (300 milligrams per day). After 160 days, levels in stored hay drop below required amounts.

In the cow, beta carotene, unlike vitamin A, is not stored extensively in the liver (as a reserve). But the normal corpus

luteum on the ovary (also called the yellow body) is rich in beta carotene. Canadian researchers have reported a relationship between supplemental beta carotene and a decrease in cystic ovaries. Dietary supplements of beta carotene will cost about 40¢ per cow per day; the recommended feeding period is 100 to 120 days after calving (or until the cow is pregnant). Research shows that the response to beta carotene supplements has varied greatly and that these supplements cannot be recommended routinely for all cows. (M.F. Hutjens, Extension Dairyman)

Udder Preparation and Mastitis

Premilking sanitation is an essential component of effective milking programs and reduces populations of mastitis pathogens and bacteria. The extent of this sanitation varies with dairy producers, depending on the degree of mechanization. The kind of premilking udder preparation directly affects the number of bacteria entering teat cup liners as well as the contamination of milk and teats. Intramammary infections, then, are directly related to bacteria on teats. Specifically, wetting the udder can increase surface drainage of water contaminated with bacteria and thus cause intramammary infections.

Recent research in Louisiana has shown that different methods of premilking udder preparation affect bacterial populations of teat surfaces differently. Thirty-two cows were assigned to various premilking udder preparation treatments: (1) use of a prep stall for 1 minute and no other preparation; (2) use of a prep stall for 1 minute with additional cleaning, massaging, and drying of the udder and teats; (3) use of a wet paper towel in wetting and cleaning teats for 1 minute with additional cleaning, massaging, and drying of teats; and (4) no udder and teat preparation. Only clean cows (no bacteria within the udder) were used for the study. Aseptic composite milk was taken at the initiation of treatment and then daily for 7 days. Standard bacteria plate counts were conducted.

Means for standard plate counts of milk composited for treatments are given in Table 2.

Table 2. The Effect of Udder Preparation Methods on Bacteria Population of Teat Surfaces

Treatments	Composite treatment milk
	Bacteria per milliliter
	Mean
1. Prep stall only	13,225
2. Prep stall + drying udder and teats	7,726
3. Wet towel teats + dry towel teats	8,062
4. No udder and teat preparation	17,908

The treatments indicate that in order to reduce potential bacterial contamination, udder surfaces need to be dry and teats clean before machine attachment. Using a prep stall only (Treatment 1) did not prevent environmental bacterial contamination. No preparation (Treatment 4) resulted in high bacterial numbers, caused by a lack of cleanliness, and in the highest composite plate counts. Drying the udder and teats (Treatments 2 and 3) resulted in the lowest bacterial counts.

The data indicate that wet and dirty udder and teat surfaces at the time of machine attachment can affect the number of bacteria entering milk. Bacterial populations in milk could then increase during milking, thus infecting the teats and increasing the potential for mastitis. (E.H. Jaster, Dairy Management)

Dairy Judging Teams Have Successful Year

The results of various contests in which Illinois dairy judging teams participated are given on the next page. We congratulate the teams on a very successful year. (R.V. Johnson, Extension Dairyman)

University of Illinois Collegiate Dairy Judging Team

Members: Karen Bejster, Arlington; Robert Kunkel, Wyanet; Brian Lyons, Granville; Glen Sachtleben, Hoyleton; Dennis DeVore, Mulberry Grove; Mark McGuire, Polo; Don Fricke, Arenzville; Mark Deters, Quincy; Duane Olson, Kewanee.

Coaches: Sidney Spahr and Gene McCoy

Contests: (1) National Intercollegiate Dairy Judging Contest, Madison, Wisconsin; overall rank: 5th among 34 teams. (2) Midwest Intercollegiate Dairy Judging Contest, Waterloo, Iowa; overall rank: 7th among 16 teams. (3) Mid-South Invitational Intercollegiate Contest, Memphis, Tennessee; overall rank: 4th among 15 teams. (4) All-American Invitational Dairy Judging Contest, Harrisburg, Pennsylvania; overall rank among 21 teams: 14th (for all breeds); 5th (for Holsteins).

Illinois Senior 4-H Dairy Judging Team

Members: Steve Boldt, Ottawa; Linda Borhart, Huntley; Roger Fluegel, Lena; Mark Knief, Burlington.

Coach: Ralph Johnson

Contests: (1) All-American Invitational Dairy Judging Contest, Harrisburg, Pennsylvania; overall rank: 2nd among 14 teams. (2) National 4-H Dairy Judging Contest, Madison, Wisconsin; overall rank: 8th among 37 teams.

Illinois Junior 4-H Dairy Judging Team

Members: Julie Barker, Davis; Eric Emmons, Anna; Lori Platz, Sigel; Beth Stewart, Smithboro.

Coach: Mike Hutjens

Contest: Mid-South Invitational 4-H Contest, Memphis, Tennessee; overall rank: 3rd among 11 teams.

M. F. Hutjens, L. W. Harpestad, R. V. Johnson Extension Dairymen

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

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Take a Dairy Holiday

Plan to attend the 1983 Illinois-Indiana Dairy Management Clinic scheduled for March 10 and 11 at the Ramada Inn, Champaign. The program will start at 1 p.m. with a discussion of heifer management. Dr. Robert Jacobsen, a nationally recognized agricultural economist from Ohio, will give an update of the national dairy outlook and the changes in policy. Steve Larson, associate editor for *Hoard's Dairyman* magazine, will be the keynote speaker at the banquet. A series of minisessions will cover a range of topics: component milk pricing, postpartum health problems, three-times-a-day milking, and computer mating of cows. A panel of dairy producers will discuss labor management methods such as recruiting, incentive programs, and partnerships.

A tour of the newly remodeled University of Illinois dairy facility will include the 200-head heifer unit, the 16-cow polygon milking parlor, and the feed-handling systems. Commercial displays will be set up and experts available for individual consultation. The registration fee of $30 is tax deductible.

For a complete schedule and for registration, contact the Dairy Extension Office, 315 Animal Sciences Laboratory, 1207 West Gregory Drive, Urbana, Illinois 61801, or call 217-333-0510. Mark your calendar and plan to join your dairy friends in Champaign. (M.F. Hutjens, Extension Dairyman)

No-Till Seeding of Pastures

No-till seeding is used in pastures to "legumize" them. Interseeding legumes (alfalfa, red clover, or birdsfoot trefoil) into pastures increases the production and quality of the pasture. No-till seeding minimizes the hazards of soil erosion and usually does not completely destroy the existing pasture. These important steps to "legumize" grass pastures should be followed:

- Graze the pasture continuously and intensively 20 to 30 days before the seeding date. This reduces the vigor of the existing pasture plants so they will not compete excessively with the newly seeded species.
- Fertilize according to soil test. The pH should be 6.5 to 7.0 because legumes are to be seeded. Apply lime at a half-plow depth. Apply phosphorus and potassium as indicated by soil test.
- Apply a herbicide for vegetation control. Paraquat or Roundup are approved herbicides.
- Seed the legumes with a no-till drill that deposits the seed just below the soil surface and provides soil-seed contact.
- Seed from late August to early September throughout the southern three-quarters of Illinois. Seed in early spring throughout the northern two-thirds of Illinois. Late August seedings in no-till pasture renovation programs should be made a little

earlier than hay crop seedings on prepared seedbeds. There is more competition in pasture seedings, and the seedlings need more time to develop strong roots before winter.

- Apply insecticides as needed. Leafhoppers, crickets, grasshoppers, and perhaps other soil and vegetation insects may become so numerous that an insecticide application is required. Careful, regular observance of the pasture will help determine when an insect problem is present.
- Manage the new seeding. Spring-seeded pastures should be ready for grazing in 60 to 70 days. Use a rotation grazing plan. For high producing dairy cows, plan 7 days of grazing followed by 28 days of rest. This schedule will require 5 fields. For lower performance animals (beef cows, dry cows, and replacement animals), plan 10 days of grazing and 30 days of rest--a schedule requiring 4 fields. Clip the pastures after each grazing if weeds are present and if grazing was not uniform. Late-summer seedings should not be grazed or clipped until the next spring when legumes are in early bud or grasses in the early "boot" stage.
- Fertilize annually with 12 pounds P_2O_5 (phosphate) and 50 pounds K_2O (potash) per ton of pasture removed. (Don Graffis, Extension Agronomist)

Effect of Blind Quarters on Milk Production

A number of first-calf heifers fail to milk from one or more quarters when they freshen. Some of these quarters do not have milk because of disease (mastitis), but some, apparently, have not developed normally. Possible causes could be the absence of teat canals, the failure of secretory tissue to develop, or other physical imperfections. Research findings recently reported on the frequency of this condition, the degree of genetic influence, and the loss of milk.

From 1959 to 1979, 38 out of 1,177 dairy cattle in first lactation freshened in a University of Florida herd with one or more nonfunctional quarters. (The total number of quarters was 48.) Table 1 lists the occurrence of the blind quarters by breed.

Table 1. Frequency of Blind Quarters Listed by Breed

Condition	Breed[a] 1	2	3	4	5	6
Normal cows	41	51	144	402	451	60
Cows with blind quarters[b]	0	0	2	25	7	4
Blind quarters[c]	0	0	2	34	7	5

[a]1, Ayrshire; 2, Brown Swiss; 3, Guernsey; 4, Holstein; 5, Jersey; 6 Holstein crossbred.
[b]One or more blind quarters.
[c]Total number of blind quarters.

A relationship between breed and effect was detected, and Holsteins and Holstein crossbreds were observed to have a higher incidence of blind quarters. Within breed, heritability was zero. A detailed examination of five quarters diagnosed as blind gave evidence that blindness was caused by a failure of the mammary duct tissue to develop rather than by ductal blockage from infection. The decreased milk production associated with blind quarters is given in Table 2.

Table 2. Effects of Blind Quarters on Production

	Number of blind quarters 1	2
Milk yield (lb.)	-1,227	-4,283
Fat test (%)	-0.12	-0.10
Days in milk	-34	-57

Milk loss associated with one blind quarter (-1,227 lb.) totaled 16.2 percent of the overall mean. The milking days for cows with one blind quarter were reduced by 34 days, which indicates a tendency for the affected animals to be culled earlier than normal. More management practices need to be developed in order to reduce the frequency of nonmastitic blindness. (E.H. Jaster, Dairy Management)

Livestock Waste Management Conference

Many of the waste-management problems facing livestock producers today can be summarized in two basic questions: How do I get manure out of livestock housing? And what do I do with it once it's outside?

These questions are the focus of a two-day Livestock Waste Management Conference planned for March 22 and 23 at the Ramada Inn Convention Center, Champaign, Illinois.

Art Muehling and Dale Vanderholm, agricultural engineers at the University of Illinois at Urbana-Champaign (UIUC), will discuss alternative methods for removing manure from buildings, including scrapers and gravity-drain gutters. Tad Kerr, area agricultural engineering adviser with the UIUC Cooperative Extension Service, will discuss storage alternatives and costs. James Fischer, USDA researcher based at the University of Missouri, Columbia, Missouri, will evaluate the production of methane from livestock wastes. Cliff Fedler, graduate assistant in the UIUC Department of Agricultural Engineering, will describe the anaerobic digester under construction on the university's swine research farm.

The facility is designed to treat the waste from 1,200 hogs with a daily methane production equivalent to 5 million BTUs. The digester will not only be used as a waste-treatment system for the farm, but also for research and demonstration purposes.

During the afternoon session, program participants will consider possibilities and procedures for processing animal wastes as feed ingredients; odor control; and land-application problems and alternatives. Participants will also look at the design and use of vegetative filters. A "mini trade show" will be open during the luncheon break and after the session adjourns at 4:30 p.m. More than 20 commercial exhibitors are expected to have tabletop exhibits and representatives on hand. The second day's program features a tour of the livestock waste management facilities on the UIUC farms.

At the beef farm, participants will get a chance to see scrapers under slotted floors, a fermenter that processes beef manure and cracked corn into feed for cattle, and a slurry-store system. On the swine farm, tour participants will see scrapers in operation in swine housing as well as the anaerobic digester for methane production. The visit to the Lincoln Avenue dairy farm will feature a liquid-solid separator and the feeding of separated solids to dry cows and heifers.

For more information and registration details, contact A.J. Muehling at the UIUC Department of Agricultural Engineering, 1208 West Peabody Drive, Urbana, Illinois 61801. (A.J. Muehling, Agricultural Engineer)

Johne's Disease

Paratuberculosis (Johne's disease), which is caused by mycobacteria, creates a very costly problem in some Illinois dairy herds. Preliminary results of a current survey of randomly selected Illinois dairy and beef herds indicate that the disease is present in about one-third of the herds. Often, signs of the disease, such as chronic diarrhea or weight loss, are not even observed. The reason for the infection remaining silent or nonclinical is not well understood. Sometimes, underfeeding and the stress of calving seem to trigger the onset of symptoms, especially in herds with a high

percentage of older cows. Symptoms and losses also appear to be more prevalent in infected herds that are confined. This may be related to the increased exposure of young calves to manure from infected cows.

Since present health regulations do not require a test for Johne's disease before the sale of breeding animals, it is important for cattle owners to be informed about the disease and methods of prevention. The following information has been adapted from an article written by Dr. R.S. Merkal, mycobacteriosis research leader at National Animal Disease Center, Ames, Iowa.

Frequency of Disease and Economic Significance

Johne's disease, which has become increasingly widespread in recent years (especially in cattle and goat herds), is most frequently transmitted from herd to herd by replacement or breeding animals that though infected, do not exhibit signs of the disease. Once Johne's disease is established in a herd, its eradication is a very costly and lengthy process. If measures are not taken to check the spread of infection within a herd, almost all the animals will eventually become infected, and a significant number will become clinically ill each year. In many cases the losses will exceed the capacity of the herd to replace itself. At present, no treatment has been found that will eliminate the infection in an animal.

Clinical Signs

Frequently, infected animals are culled for other reasons, such as breeding problems or mastitis, before the typical signs of Johne's disease become apparent. Although the appearance of clinical signs depends somewhat on the numbers of bacterial organisms ingested, the first signs of illness most frequently appear in cattle three to five years of age. The animals become thin, develop a rough, off-colored coat or lose hair, and have periods of moderate to severe diarrhea. They may have intermittent fever and frequently refuse to eat or drink. Runny eyes, increased breathing sounds, and signs of intestinal distress may be noticed. Eventually affected animals become depressed and develop muscle tetany that forces them to hold their heads to one side. Death may occur after prolonged, intermittent bouts of diarrhea and weight loss.

Disease Progression

In most cases, the bacteria are ingested during nursing; then they slowly multiply within scavenger cells in the intestinal wall and the abdominal lymph nodes. The organisms are shed in the feces for many months before signs of illness become apparent. Since the organisms multiply within scavenger cells, they are protected from antibodies formed by the animal and most drugs that may be used for treatment. The disease develops over a long time period. In a pregnant animal, the disease remains stable during the last two-thirds of pregnancy. Then, within several weeks after calving, the illness may advance very rapidly.

Diagnosis

Most of the serum and allergy tests devised for other diseases have been tried in the diagnosis of Johne's disease. During the very early stage of infection, few tests are successful. In the tuberculoid stage, skin tests become positive. Some animals that reach this stage eliminate the organisms from their body and recover. Other animals progress to the intermediate stage where tests that detect serum antibodies become positive. Beyond this stage, skin tests again become negative. At the time the less sensitive serum tests are positive, the animals usually start shedding enough organisms in their feces to permit detection by fecal cultural techniques. Although animals that have recovered or have been exposed to other closely related organisms may react in the serum or skin tests, only heavily infected

animals unlikely to recover will be detected by fecal culture. Animals that are culture positive may not show signs of clinical illness for several years yet will shed the organisms and expose other animals to the infection. Thus fecal culture is the best test for identifying animals to be culled.

Vaccination

Both live and heat-killed, laboratory-adapted strains of *Mycobacterium paratuberculosis* have been used for vaccination. The organisms are suspended in mineral oil or incomplete Freund's adjuvant and inoculated subcutaneuosly in the brisket area. Live organisms are used for vaccination in Europe, but only the heat-killed bacterin has been approved for use in the United States. The bacterin produces a swelling at the vaccination site that may reach 5 to 6 inches in diameter, which occasionally will open and drain. The delayed skin hypersensitivity and circulating antibody induced by the bacterin prevents the subsequent use of these testing procedures for detection of infected animals in vaccinated herds. In field trials where herds were vaccinated with the heat-killed bacterin, the number of clinical cases was reduced 90 percent and the number of infected cattle was reduced 50 percent. The use of the bacterin is recommended only when it is not feasible to control the disease by improved husbandry.

Control

Prevention of the initial infection is the most desirable option. Although no current test can detect all infected animals, the risk of purchasing an apparently healthy yet paratuberculous animal can be reduced by testing all animals in the herds from which replacement or breeding animals are to be purchased. Fecal culture, serum tests, or allergy skin tests may be employed. If any animal in the herd reacts, no animals should be purchased from that herd. Obviously, animals should not be purchased from herds in which Johne's disease has been clinically detected.

After paratuberculosis has been established in a herd, the procedures for eliminating the disease include the following husbandry recommendations:

1. Remove newborn animals from their dams at birth and raise them in separate, noncontaminated quarters.

2. Feed the young animals only pasteurized milk or milk replacer.

3. Make sure that no fecal contamination from the adult herd is carried on footwear or feed supplies to the young animals.

4. Do not mix the replacement animals with the adult herd until they are each at least one year old.

5. Take fecal samples for culture from all adult animals at 6-month intervals. All animals found to be shedding the organisms should be sent to slaughter, as well as all animals that exhibit clinical signs of the disease.

6. Thoroughly clean all equipment and pens that need to be disinfected to remove all traces of feces. Then soak in a disinfectant that contains orthophenylphenol and a detergent. Quaternary disinfectants will not kill *M. paratuberculosis*.

7. Plow contaminated feedlots and cover with 6 inches of fresh, noncontaminated soil.

8. Do not spread manure on pastures.

9. Serum or allergy skin tests may be useful in nonvaccinated animals to estimate the exposure level within the herd but should not be used as a basis for culling. Currently available tests identify not only the animals that have been exposed to *M. paratuberculosis*, but also those animals that have been

exposed to related bacteria such as Nocardia or Corynebacteria.

10. Use vaccination only when the above husbandry recommendations are not feasible, and even then, follow as many recommendations as possible because exposure of the young animals to large numbers of organisms destroys the protective effect of the vaccine. If a vaccination program is to be used, administer the bacterin during the animal's first month of life. Because the bacterin can produce a serious lesion if accidentally injected into human tissue, it should be administered only by a state-approved veterinarian trained in its use. Permission to vaccinate a confirmed infected herd must be obtained from the state veterinarian. (R.D. McQueen, Dairy Extension Veterinarian)

M.F. Hutjens, G.W. Harpestad, R.V. Johnson Extension Dairymen

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

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Dairy Prices: Outlook and Options

The 1983 outlook for milk prices reflects the plans and actions of various groups--Congress, the National Milk Producers Federation, milk marketing organizations, and farm policy groups. Three of the most popular pricing options put forward by these groups were discussed by Dr. Robert Jacobson, dairy economist, Ohio State University, at the 1983 Illinois-Indiana Dairy Management Clinic. These options are evaluated below.

OPTION 1: A government assessment of 50¢ per one hundred pounds of milk. Although the Secretary of Agriculture can implement this plan immediately, it is essentially negative, because it neither benefits the consumer directly, nor does it provide an incentive for the producer. The plan could, however, generate $600 million dollars to reduce the cost of the government's support program.

OPTION 2: Abolishing the price support program. According to one estimate, this measure could result in a price decrease of $2.50 per hundred pounds of milk. Congressional legislation would be required for implementation of this plan. The advantages are that the plan eliminates government involvement, stimulates demand, lets market pressures (of supply and demand) operate, and lowers government costs. The disadvantages are that the plan increases milk production in the short run, mainly affects beginning dairy producers and producers heavily in debt, and could take three to five years of implementation for the current situation to be corrected.

OPTION 3: Base or quota plan with an incentive to reduce production. Again, this plan requires congressional action. The advantages are that it reduces production, surplus, and government costs; protects current producers; and maintains the current price level. Disadvantages are an absence of incentives for increasing consumption or demand; excessive government regulation; lack of support from the administration; no ready source of incentive money to reduce milk production; and management problems pertaining to the entry or exit of producers. One possible quota plan recommends the following:

- maintain the current price at $13.10
- establish current base levels on the basis of 1981-82 production figures
- pay producers $10 per hundred pounds, up to 30 percent of the base, not to produce milk (a program similar to the payment-in-kind program--PIK)
- require the slaughter of culled cows
- impose an assessment or penalty for over-production

Dairy producers must continue to make their ideas and comments heard through their milk marketing organizations, farm

groups, and legislators. The solution does not lie in no action and no reaction. It is evident that a plan is being developed, so now is the time to be heard. (M.F. Hutjens, Extension Dairyman)

1983 Pest Management Guide

To achieve maximum production, dairy producers must manage the insect pests that afflict their animals. Growth and milk production can be reduced by flies, lice, mites, ticks, and grubs because these pests irritate animals and sometimes suck their blood. Occasionally, animals have even been killed by attacks from large numbers of pests such as horse flies, lice, and mites. Several of these pests transmit diseases from animal to animal. As a result, pest-related losses each year cost Illinois farmers millions of dollars. Dairy producers, however, do not need to share their profits with insects--these pests can be managed effectively.

A complete insect pest management program includes the wise selection of cultural, mechanical, biological, and chemical methods for controlling the major insect pests infesting livestock and livestock barns. Insecticides, however, are still the most efficient means of managing most insect problems. The *1983 Insect Pest Management Guide* lists only the safest, most effective insecticides for each specific insect on each type of livestock.

When using insecticides, read the label and follow the instructions. Do not exceed the rates suggested; observe the interval between application and slaughter, and apply the insecticide only to those animals for which use has been approved. Keep a record of the insecticide used, trade name, percentage of active ingredients, dilution, rate of application, and dates of application so that if ever questioned, you will have the records.

Copies of the livestock and livestock barn guide are available through the Office of Agricultural Publications and county Extension offices. (S. Moore III, Extension Entomologist)

Chlamydia–A New Threat to Dairy Herds?

In recent months, many Illinois dairy producers have called their veterinarians asking if the reproductive problems, lameness, and respiratory problems common to many herds are due to a "new" germ called Chlamydia. Many dairy producers have been approached by salespersons who have offered to provide "special" diagnostic tests and then a vaccine for use on all cattle, sheep, goats, and cats on the farm. The questions raised are numerous and far reaching.

First, Chlamydia is the most recent name given to several strains of a unique bacterium that was first discovered in the 1930s. The resultant disease, affecting humans and birds, was then called *psittacosis*, after the type of birds involved. The bacteria are unique in that they multiply only within living cells, much like viruses, in contrast to other bacteria, which usually multiply outside living cells. Unlike viruses, however, Chlamydia are sensitive to antibiotics, especially the tetracyclines.

Two species of Chlamydia are recognized, one affecting humans and the second, *Chlamydia psittaci*, affecting domestic animals. A number of different strains exist within domestic animals, making a specific diagnosis difficult. The many strains, plus the unique growth and multiplication characteristics of Chlamydia, also make effective vaccination difficult. The bacteria can infect most domestic animals, many wild animals, and more than a hundred species of domestic and wild birds.

Generally, a long-lasting, inapparent infection develops. Occasionally, though, some animals may experience a severe or even fatal reaction. The

intestinal tract is the natural habitat for Chlamydia and inapparent intestinal infections are common in adult cattle and sheep. The organism is shed in manure. When clinical illness develops in animals, the symptoms observed will depend on the route of infection and the immune system of the animals. Calves under ten days of age that are deprived of colostrum may develop diarrhea. However, the role of Chlamydia in the calf diarrhea complex is uncertain because many other bacteria, several viruses, and faulty nutritional practices also cause diarrhea. More than one infectious agent, therefore, may be responsible for field scours outbreaks. An accurate diagnosis requires culture and identification of the specific causative agent(s) present in animals with diarrhea.

The most clear-cut condition attributed to Chlamydia in farm animals is enzootic ovine (sheep) abortion. The disease seldom occurs in flocks lambing on pasture, but it occurs frequently in ewes lambing in confinement where contamination of lots and buildings is greatest. Oral transmission of Chlamydia ultimately causes infection of the placenta and fetus. A similar Chlamydial disease, epizootic bovine abortion, found in the western United States, can cause cows to abort in the last half of pregnancy. Cows rarely abort twice and attempts to produce an effective vaccine have so far been unsuccessful. Field treatment with chlortetracycline has reduced the incidence of abortion in herds where laboratory diagnosis has confirmed that abortion was being caused by Chlamydia.

Chlyamydial bacteria have been isolated from some respiratory and eye infections of calves. Chlamydia may also cause pneumonia in calves. This may be subclinical; mild enough to be detected incidentally at slaughter; or of moderate severity. In experimental studies however, the disease could not be produced without the concurrent presence of other pneumonia-causing bacteria, reovirus, or parainfluenza virus.

A vastly different strain of Chlamydia, appearing sporadically, has also been isolated from the joints of young lambs and calves. Affected calves are born weak, develop stiff and markedly enlarged, painful joints, and may have mild diarrhea. Death follows in two to ten days. Again, many other bacteria can cause joint infection, so laboratory culture and identification are essential.

In summary, the exact role of Chlamydia in bovine reproductive disorders, joint infections, respiratory infection, and diarrhea is unclear.

The same could be said for other opportunist bacteria (*Hemophilus somnus*, Ureaplasma, and Mycoplasma) that can be found in both normal and abnormal animals. Much more research and field investigation, and improved laboratory diagnostic tests are needed to understand fully the role of such bacteria in reproductive, respiratory, intestinal, and joint problems of our increasingly larger and confined dairy herds. The state diagnostic laboratories remain the best, unbiased source of diagnostic assistance for dairy producers and veterinarians.

It is unfortunate that federal standards of vaccine safety and effectiveness are hard to enforce because of interstate shipments from small unlicensed labs. If doubt exists about the need to vaccinate, or if a vaccine has not met federal standards, seek the opinion of knowledgeable professionals and use the state diagnostic laboratories to avoid unwarranted vaccinations. Decisions about disease control practices should be made only after deliberate examination of the best available information and consideration of the risk and cost-benefit for each dairy enterprise. (R.D. McQueen, Dairy Extension Veterinarian)

Syncro-Mate-B and Estrus Synchronization

Recently research on the artificial insemination of dairy heifers has received fresh impetus. A new compound has been approved by the Food and Drug Administration for use in estrus synchronization of beef and dairy heifers. The compound is Syncro-Mate-B^{R}, a product containing a synthetic progestin, and estradiol valerate (a synthetic estrogen). The product is implanted in the ear and the animal is given an intramuscular injection at the time of implantation. After the implant is removed 9 days later, most of the heifers will show estrus within 32 to 54 hours.

Progestins and Estrus Synchronization

Synthetic progestins have been studied for many years for estrus synchronization. When administered orally in feed for about 16 days, synchronization was accomplished but fertility significantly reduced at the synchronized estrus. Similar findings have been reported when progestin implants were left in place for 16 days. However, when estrogen was injected at the time of implantation, synchronization was still accomplished, and fertility was not depressed. The implant was removed after 9 days. It was also shown in these early studies that some anestrous animals started estrous cycles after the treatment. These early findings led to the development and extensive testing of the Syncro-Mate-B procedure.

How Syncro-Mate-B Works

According to the Syncro-Mate-B procedure, a small implant (6 mg synthetic progestin) is placed subcutaneously in the ear of the cow. At the time of implantation each animal receives an intramuscular injection of 3 mg synthetic progestin plus 5 mg estradiol valerate. These compounds together act upon the hypothalamus-pituitary to prevent the release of hormones that stimulate the ovary as in the normal estrous cycle. This inhibition occurs as long as progestin is present. Estradiol appears to either prevent the development of corpora lutea (if given early in the estrous cycle) or enhance the regression of corpora lutea (if given later in the estrous cycle). When the inhibition (implant) is removed, a follicle-stimulating hormone is released from the pituitary gland that quickens the growth and development of ovarian follicles. The animals then express estrus or standing heat, and ovulation occurs. As a result, the ovum, when inseminated at the proper time, will be fertilized.

Timed Insemination

Field test results show that a high percentage of heifers will exhibit estrus between 32 to 54 hours after implant removal. Heifers can be artificially inseminated as recommended in relation to standing heat, or they can be inseminated 48 to 54 hours after implant removal regardless of the observation of standing heat. In both situations conception will be satisfactory. The second method of timed insemination would decrease the labor and time necessary for heat (estrus) detection. However, a slightly lower conception (fertility) can be expected from timed insemination than from insemination based on observation of standing heat. Those heifers that do not conceive will have a normal estrous cycle and can be reinseminated at the next standing heat at about 21 days with normal fertility.

Value for Dairy Producers

The approval of the use of Syncro-Mate-B on dairy heifers gives dairy producers an alternative method of artificial insemination for their heifers. The use of this new compound, like the use of prostaglandins, will not overcome poor management and should not be expected

to improve conception more than does a well-managed program for the artificial insemination of heifers. The procedure discussed could be useful in situations where time, labor, and facilities are not available for an effective program of daily, routine, heat detection. (J.R. Lodge, Dairy Physiologist)

Evaluation of Nine Teat Dips

Chlorine, chlorhexidine, and iodophor teat dips have been evaluated in various studies for their effectiveness in reducing the incidence of intramammary infection (IMI). Dairy producers in Ireland evaluated hypochlorite formulations containing 1, 1.2, and 4 percent available chlorine. The incidence of IMI was not reduced by formulations of 1 and 1.2 percent. The 4 percent formulation reduced IMI approximately 60 percent. Scientists in Louisiana reported decreases of 91 and 58 percent in IMI of *Staphylococcus aureus* (SA) and *Streptococcus agalactiae* (SAg) when teats were dipped with a product containing 4 percent sodium hypochlorite. Reports from a New York dairy research station indicate that teat dips with 4 percent hypochlorite and 1 percent iodophor were equally effective. In England, workers evaluated solutions of 0.5 percent chlorhexidine and 0.2 percent iodine in experiments in which teat cups were contaminated with SA and SAg. Both hygiene routines were effective.

Iodophor teat dips containing 1 percent iodine were evaluated at a Louisiana station under both natural exposure and experimental challenge to mastitis pathogens. Most teat dips were highly effective and have become the standards of comparison.

Recently, a new product was tested. Povidone-iodine (PVP-1), an iodophor in which the polymeric material (polyvinylpyrrolidone) is the solubilizing agent for iodine, was tested at Louisiana State University. In seven trials, cows were challenged with either SA or SAg. Nine postmilking teat dips formulated at different concentrations were evaluated on the challenged cows. Efficacies against SA were compared by use of products containing 0.9 percent sodium hypochlorite, 0.6 percent sodium hypochlorite, 1 percent sodium-dichloro-s-triazene-trione (SDT), 0.55 percent chlorhexidine gluconate (CHG), and 0.35 percent povidone iodine (PVP-1). (See Table 1.) Workers at Louisiana State University reported that both sodium hypochlorite formulations showed poor results. The 77.9 percent efficacy of 0.35 percent PVP-1 was encouraging because this was the first report on the use of this product as a teat dip.

The efficacy of teat dips against SAg is summarized in Table 1. The three iodine formulations evaluated were effective to the following extent: 28.9, 44.8, and 50.7 percent. No differences were observed between formulations of high and low viscosity. The incidence of IMI was reduced 48.1 and 63.2 percent by SDT products. The chlorhexidine reduced infections caused by SAg 71 percent. The efficacy of PVP-1 was 67 percent. (E.H. Jaster, Dairy Management)

Table 1. Efficacy of Nine Teat Dips

Teat dip	Concentration (%)	Decrease in *Staphylococcus aureus* (%)
Sodium hypochlorite	0.9	56.8
Sodium hypochlorite	0.6	28.3
Sodium dichloro-s-triazene-trione (SDT)	1.0	75.9
Chlorhexidine gluconate (CHG)	0.55	92.5
Povidone iodine (PVP-1)	0.35	77.9

Table 1 —continued

Teat dip	Concentration (%)	Decrease in *Streptococcus agalactiae* (%)
Iodophor	1.0	28.9
Sodium dichloro-s-triazene-trione (SDT)	1.7	48.1
Iodophor-high viscosity	1.0	44.8
Iodophor-low viscosity	1.0	50.7
Sodium dichloro-s-triazene-trione (SDT)	1.0	63.2
Chlorhexidine gluconate (CHG)	0.55	71.0
Povidone iodine (PVP-1)	0.35	67.0

The information given in this publication is for educational purposes only. Reference to commercial products or trade names does not constitute an endorsement by the University of Illinois and does not imply discrimination against other similar products. The reader is urged to exercise the usual caution in making purchases or evaluating product information.

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ILLINOIS DAIRY DIGEST
FACTS FOR LAND OF LINCOLN DAIRYMEN

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Economical Feed Alternatives

The dairy feed situation in Illinois does not look good. Because of the heat and drought, second, third, and fourth hay crops have been below normal in yields. Drought-stressed corn has replaced the excellent corn silage harvested last year. Corn prices are heading toward $4 a bushel, soybean meal costs over $300 a ton, and excellent quality hay is selling for $120 a ton. As if feed prices weren't high enough, milk prices are remaining static or declining. Producers must now think of economical feed alternatives. Some suggestions are given below.

WET BREWERS' GRAIN is an economic possibility in some areas. Cows can be fed 30 to 40 pounds per day or 25 percent of their total ration dry matter. If corn is worth $7 per 100 pounds and soybean meal is worth $14 per 100 pounds, wet brewers' grain (80 percent moisture) is worth $39 per ton. Be sure you use it up before mold develops and palatability drops.

WET CORN GLUTEN FEED can be fed at the same rate as wet brewers' grain. Watch prices to ensure wet feeds are a "good" buy (below $90 a ton). Check dry matter levels in wet feed.

CORN STALKS are an effective forage stretcher for low producing cows, dry cows, and older heifers. However, a sound mineral and vitamin program is necessary. If stalks are harvested immediately after the combine or picker is used, moisture levels may be adequate for ensiling. Low calcium and energy levels in the feed can be pluses in the dry cow program.

DROUGHT-STRESSED CORN contains 75 to 95 percent the energy value of normal corn silage. Testing this material will allow for accurate ration formulation since it varies greatly.

ALFALFA PELLETS AND CUBES can be substituted for half of the forage dry matter if the remaining forage is long enough. Secure a guaranteed protein and fiber analysis to determine forage quality. Compare the price of pellets or cubes to current hay prices.

UREA can be an alternative that cuts your protein bill for older heifers, dry cows, and low producers. A maximum of 0.4 pound urea per adult animal per day can replace a pound of soybean meal. Don't feed urea to high producing cows in early lactation or to high producing

herds (that is, those producing over 15,000 pounds of milk annually).

LIQUID WHEY is another alternative, but it is low in dry matter, which increases the cost per pound. Delivery costs must also be taken into consideration. Cows can drink 100 to 200 pounds of whey a day, which contains 6 to 12 pounds of dry matter. Liquid whey must be readily available, fed fresh each day, and gradually introduced into the diet.

STRAW is not a good alternative since it is low in feed value and digestibility unless treated with anhydrous ammonia. It is mainly a bulk ingredient.

Besides looking at alternative feeds, you should also use your existing feed resources correctly. In order to do so, you MUST:

- Test forages routinely.
- Balance and reevaluate cow and heifer rations routinely.
- Feed grain to cows that are producing the most milk.
- Be sure that good cows in early lactation are not underfed.
- Consider bulk purchases of grain and commercial supplements.
- "Lock in" prices on commercial supplements, if possible and economical.
- Shop around for "good" buys.
- Calculate your cost per unit of nutrient when comparing feeds.
- Conduct a feed inventory to know if you have enough.
- Cull marginal cows and heifers, using your DHI records.

(M.F. Hutjens, Extension Dairyman)

Reduced Dosage of Brucella Vaccine

The *Brucella abortus* Strain 19 vaccine is now commercially available in reduced dosages. USDA veterinary biologic licenses have been issued to Burroughs Wellcome Company and Colorado Serum Company to sell the product. The Bayvet Division of Miles Laboratory is reported to have its product in the final testing stage.

Commercially produced vaccine will become available for use in 16 states where it had not been available previously, including Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Ohio, and Wisconsin. The reduced dosage vaccine contains 3 to 10 billion viable organisms in a 2 milliliter dose, whereas the standard vaccine contains 90 billion viable organisms in a 5 milliliter dose.

Until now, the reduced dosage vaccine was available only in states with special laboratory facilities for diluting the standard vaccine. In these states, the specific state departments of agriculture provided the vaccine for use within the state. The Illinois Department of Agriculture has not provided brucellosis vaccines for several years. Licensed Illinois veterinarians thus buy the vaccine directly from commercial companies of their choice.

The reduced dosage Strain 19 vaccine has been shown to offer substantial protection against brucellosis infection but with less risk of postvaccination titers remaining and interfering with future blood tests--an occasional problem when

Table 1. Alternative Feed Nutrient Composition

	Dry matter	Crude protein	TDN	Calcium	Phos
	%	*Dry matter, %*			
Wet corn gluten feed	50-60	28	82	0.51	0.86
Wet brewers' grain	20-30	26	72	0.29	0.54
Corn stalks	50-90	5	50	0.60	0.09
Drought-stressed corn silage	30-50	9	60	0.25	0.20
Urea	95	282	0	0	0
Straw, wheat	80-90	4	44	0.21	0.08
Liquid whey	4-7	14	78	0.98	0.81

the standard 5cc dose of the Strain 19 vaccine is administered.

In Illinois, both beef and dairy heifer calves can be legally vaccinated against brucellosis when they are not less than 60 days and not more than 210 days old. The optimum age for vaccination with the reduced dosage vaccine, according to currently available information, is from 4 to 7 months. If the full strength Strain 19 vaccine is used, the optimum age remains 2 to 4 months. The preferred product, however, is the reduced dosage vaccine.

Officially vaccinated calves are allowed free movement within Illinois until they are 24 months of age. Even after this age they are given some special consideration in the brucellosis blood test interpretation when vaccination history is provided. (Paul Spencer, Chief Veterinarian, Bureau of Animal Health, Division of Meat, Poultry, and Livestock Inspection, State of Illinois Department of Agriculture)

State of Brucellosis in Illinois

The number of calves vaccinated has increased from 3.4 million in 1975 to 7.6 million in 1982. That rate should increase even more, now that reduced dosage vaccine is available in Illinois and other midwestern states. More states now require or strongly recommend the vaccination of calves. At least 20 states now have some requirements regarding the vaccination of imported cattle. Thus in addition to increasing the immunity of dairy cattle to brucellosis on exposure, vaccination increases the market value of vaccinates.

As of August 1, 1983, 21 Illinois herds were quarantined because of brucellosis infection, including one dairy herd. Infected herds were present in 12 counties scattered throughout Illinois. To reduce the risk of introducing brucellosis into your herd, buy only officially vaccinated heifers. Before purchase, adult cattle should be given blood tests and found negative. They should be isolated for 30 to 120 days and retested before they are added to your herd. The longer isolation period is for cows tested immediately before purchase. (R.D. McQueen, Dairy Cattle Extension Veterinarian)

Spray Application of Postmilking Teat Sanitizer

Until now, intramammary infection (IMI) in dairy cows was controlled by the use of teat dips. Research conducted in Louisiana, New York, and England has proved the efficacy of this method. Now, however, a new method has been developed: the application of postmilking teat sanitizer by means of a spray. There are two different kinds of spray devices—a hand-held reservoir with a pressure plunger, and an electric pump with a reservoir unit that has drop hoses located in the milking parlor. The advantages of using the electric pump with a reservoir are as follows: (1) easy access to spray nozzles; (2) optimal spray pressure; (3) teat sanitizer uncontaminated with organic matter (as could happen with dip cups); and (4) sanitizer unspilled. Research on the automated application of teat dips was recently reported from Louisiana State University. Two experimental challenge trials were completed, which used teats inoculated with *Streptococcus agalactiae*. A 0.5 percent quaternary ammonium postmilking sanitizer was used in both trials. Trial 1 involved 114 cows and lasted for 9 weeks. Teats on the left side were dipped, and those on the right side were sprayed. Trial 2 lasted 7 weeks and used 105 cows. Left fore and right rear teats were sprayed, while right fore and left rear teats served as untreated controls. The teat spray unit had a 0.16 horsepower, 110-volt, single diaphragm pump with plastic and stainless steel components.

Eighteen *S. agalactiae* intramammary infections were diagnosed in Trial 1—10 in sprayed and 8 in dipped quarters (Table 2). There was no difference in percent between the quarters that were infected. In Trial 2, 28 *S. agalactiae* intramammary infections were confirmed, 20 in control and 8 in sprayed quarters.

Table 2. Efficacy of Teat Spraying Against *Streptococcus agalactiae*[a]

Treatment	No. of quarters	*S. agalactiae* infections Quarters	Reduction
Trial 1		*percent*	
Spray	205	4.9	
Dip	205	3.9	20.4
Trial 2			
Spray	185	4.3	
Control	192	10.4	58.6

[a]Louisiana State University results.

Teat spraying was as effective as dipping in preventing IMI caused by *S. agalactiae*. However, teat spraying is only as good as its application. The researchers in Louisiana report that a spray is only effective when it is applied to a teat from directly below to cover all sides. A drop of sanitizer should then collect on the bottom end of the teat. (E.H. Jaster, Dairy Management)

Cost to Produce Milk in 1982

The results of a cost-production study of 182 Illinois dairy farms with an average of 72 cows per farm show that the total cost to produce milk in 1982 was $13.82 per 100 pounds (Table 3).

Table 3. Cost and Returns for the Dairy Enterprise by Size of Herd, 1982

	Number of cows in the herd All	40-80	Over 80
Number of farms	182	134	48
Average per farm:			
Number of cows	72	60	105
Milk produced per cow (lb.)	13,860	13,639	14,477
Beef produced per cow (lb.)	581	564	628
	Costs per cow in the herd		
Costs, milk plus beef	$ 2,219	$ 2,199	$ 2,273
less average returns from beef	301	291	330
Net cost for milk	$ 1,918	$ 1,908	$ 1,943
Return from milk	1,802	1,774	1,882
Return above all cost	-116	-134	- 61
	Costs per 100 pounds of milk produced		
Net price received	$ 13.01	$ 13.01	$ 13.00
Feed costs	6.05	6.15	5.77
Return above feed costs	$ 6.96	$ 6.86	$ 7.23
Nonfeed costs:			
Buildings	$ 0.66	$ 0.65	$ 0.70
Machinery and equipment	1.72	1.76	1.61
Labor	1.94	2.00	1.76
Livestock expense	0.80	0.78	0.84
Taxes	0.11	0.12	0.07
Insurance and overhead	0.14	0.14	0.16
Interest charge on all capital	2.40	2.40	2.40
Total, nonfeed costs	$ 7.77	$ 7.85	$ 7.54
Total, all costs	13.82	14.00	13.31
Return above all costs[a]	-0.81	-0.99	-0.31

[a]No charge was made for management.

Feed costs made up 44 percent of the total, or $6.05. Nonfeed costs were $7.77. The net price received for milk averaged 81 cents per 100 pounds below the total cost of production in 1982 on these farms. When the farms were separated into two size groups, 40 to 80 cows and over 80 cows, the larger herds received 68 cents more per 100 pounds of milk produced above all costs from milk than the smaller herds. This difference amounts to $97 per cow or $10,185 more returns from herds with 105 cows.

Returns above all costs per cow have been declining each year since the record high year in 1979 (Table 4). Costs of production have been increasing faster than the price of milk, especially interest costs. But the 8 percent lower feed cost in 1982 offset part of the effect of higher nonfeed costs and lower milk and beef prices. With less favorable dairy support prices and continued high production costs, dairy producers can expect lower net incomes until milk supplies are sufficiently reduced so that they are consistent with the demand for milk products. The larger dairy herds have slightly lower production costs, especially labor costs, and higher production per cow. These factors will become more important in the cost-price-squeeze period that is anticipated. (D.F. Wilken, Farm Management Specialist)

Why Cows Leave Home

A recent summary of information about 137,402 cows that left the Mid-States DHI Processing records system is given in Table 5.

Table 5. Mid-States Information Summary

Reason	Percent leaving	Milk yield (lb., 305-M.E.)
Ketosis	0.8	12,423
Low production	20.8	11,566
Mastitis	10.0	12,864
Reproduction	13.7	14,490
Death	5.2	13,185
Sold for dairy	12.0	14,025
Injury or other	37.5	12,749

Table 4. Cost and Returns per Cow, 1979-1982

	1979	1980	1981	1982
Number of farms	160	174	201	182
Number of cows	71	70	73	72
Total per cow:				
Costs, milk plus beef	$ 1,750	$ 2,038	$ 2,235	$ 2,219
Less actual returns from beef	339	330	272	301
Net cost for milk	$ 1,411	$ 1,708	$ 1,963	$ 1,918
Return from milk	1,602	1,734	1,834	1,802
Return above all cost	$ 191	$ 26	$ -129	$ -116
Price received per 100 lb. of milk	$ 11.67	$ 12.32	$ 13.23	$ 13.01
Price received per 100 lb. of beef	59.27	56.84	52.73	48.47
Pounds beef produced per cow	572	580	568	581
Pounds milk produced per cow	13,727	14,077	13,862	13,860

The total culling rate of cows on hand was 27.8 at the beginning of the year. Injury, mastitis, and reproduction continue to "automatically" cull cows, slowing genetic progress. Unfortunately, cows sold because of reproductive problems were the highest producing group of cows culled. How do your culling patterns compare? (M.F. Hutjens, Extension Dairyman)

Area DHIA Meetings

November	21	Effingham
	22	Breese
	23	Peoria
December	12	Kankakee
	13	Woodstock
	14	Sterling
	15	Freeport

M.F. Hutjens, G. W. Harpestad, R. V. Johnson Extension Dairymen

Cooperative Extension Service
United States Department of Agriculture
University of Illinois
At Urbana-Champaign
1301 W. Gregory Drive
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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 12, Number 4 *December, 1983*

1984 Area Dairy Days– Searching for Hidden Dollars

Mark your calendar now and plan to attend the 1984 Illinois Area Dairy Day nearest you. The dates and locations are listed below.

January 9	Kankakee, Extension Office
January 10	Marengo, Shady Lane Restaurant
January 11	Freeport, Masonic Temple
January 11	Elizabeth, Community Building
January 12	Sterling, Emerald Hill Country Club
January 13	Pekin, Agricultural Center
January 17	Quincy, Farm Bureau Building
January 18	St. Libory, American Legion Hall
January 19	Breese, American Legion Hall
January 20	Effingham, Extension Center

The meeting, consisting of an information-packed program, will start at 10:30 a.m. The theme of this year's program is "Searching for Hidden Dollars." Some of the topics to be discussed are: static milk prices and increasing costs; forage utilization; and herd health. The schedule is as follows:

10:15 a.m.	Registration
10:30 a.m.	Forage Options and Opportunities
11:30 a.m.	Lunch (Dutch treat)
	Viewing Commercial Displays
1:00 p.m.	An Update on Effective Herd Health Programs
1:45 p.m.	Managing Your Profit Margin
2:30 p.m.	Questions and Discussion

Commercial displays will be featured at the Freeport, Sterling, Effingham, St. Libory, and Breese meetings. Come early to see the latest in agribusiness and available services. A $3 registration fee includes the *1984 Dairy Report*. At Elizabeth,the program will be switched around so that the afternoon's events, featuring the speakers from Freeport, will be held in the morning. (M.F. Hutjens, Extension Dairyman)

New Genetic Base Changes

Predicted Difference continues to be a tool for ranking dairy sires on their ability to transmit genetic merit. The averaged Predicted Difference (PD) of all sires weighted by the number of their first lactation heifers calving in 1982 defines the PD82 genetic base at zero for all dairy breeds. The old genetic base was PD74. PD82 equals

PD74 plus the genetic base change. The new genetic base merely updates the zero point. Genetic base changes for milk and fat yield and fat percentage by breed are listed in Table 1.

Table 1. Genetic Base Changes[a] for Milk and Fat Yield and Fat Percentage by Breed[b]

Breed	Milk	Fat	Fat
	lb	*lb*	*%*
Ayrshire	-637	-22	+0.03
Guernsey	-781	-30	+0.07
Holstein	-978	-28	+0.05
Jersey	-993	-34	+0.16
Brown Swiss	-1,094	-35	+0.07
Milking Shorthorn	-992	-41	-0.04

[a]PD82 = PD74 + genetic base change.
[b]Based on information supplied by F.N. Dickinson, AIPL, Agricultural Research Service, USDA, Beltsville, Maryland.

The top Holstein bull for PD milk after the summer 1983 sire summary was Enchantment at +2,932 (PD74). The base change alone will lower his PD by 978 pounds to +1,954. All Holstein bulls will be lowered a similar 978 pounds. This bull will probably still be the top bull for PD milk. However, more daughters and more information per daughter could alter the ranking. Very few, if any, bulls will exceed +2,000 PD82 for milk in the winter 1984 sire summary. Several bulls will exceed +2,000 after the winter 1985 sire summary because genetic progress will continue to increase even when the genetic base changes. Selection goals will need to be increased with PD82, just as they needed to be increased with PD74. Enchantment had a PD74 percent fat of -0.10; adding the genetic base change of +0.05 suggests that his PD percent fat will be -0.05. His daughters have not improved, just the genetic base has changed. About 20 percent of the active AI bulls will be "double plus" (positive for both PD milk and PD percent fat).

Cow indexes (CI82) will also change as a consequence of the new genetic base. Most genetic progress results from selection of sires. That progress is transferred to the cow population where it is manifested several years later. With the new genetic base, the average sire is zero and the average cow is below zero (Table 2). Both bulls and cows are expressed to the same genetic base so that they are directly comparable for calculating genetic indexes. Only 20 percent of Holstein cows are expected to have a CI82 for dollars above zero. The averaged CI82 dollars are anticipated to be -43 for Holsteins. CI82 milk and fat are also listed in Table 2 for each breed. You have an elite herd if your herd average CI82 for dollars is above zero. (R.D. Shanks, Dairy Geneticist)

Table 2. Projected Average CI82s for Cows Alive and in January 1984 Evaluations by Breed[a]

Breed	Percentage with positive CI dollars	Average CI82 Dollars	Milk	Fat
	%		*lb*	*lb*
Ayrshire	29	-21	-167	-6
Guernsey	19	-35	-291	-10
Holstein	20	-43	-388	-11
Jersey	15	-46	-375	-13
Brown Swiss	15	-51	-463	-13
Milking Shorthorn	18	-40	-283	-13

[a]Supplied by F.N. Dickinson, AIPL, Agricultural Research Service, USDA, Beltsville, Maryland.

Wet By-Product Feeds

Low quality forage and short feed supplies have caused problems for some dairy producers. Wet by-product feeds, however, are locally available in Illinois. And the price is right! Wet corn gluten feed is a by-product of the wet milling of corn, corn sweeteners, and fuel ethanol. Wet brewers' grain is

the grain residue from the manufacture of beer. The composition of these feeds is listed below.

Table 3. Chemical Composition (Expressed on a 100 Percent Dry Matter Basis)

	Wet corn gluten feed	Wet brewers' grain
	percent	
Dry matter	40-45	20-30
Crude protein	21	28
T.D.N.	86	71
Crude fiber	4	19
Calcium	0.10	0.20
Phosphorus	1.00	0.64
Magnesium	0.51	0.29
Potassium	1.53	0.15

These wet feeds can replace grain or forage in the feeding program. Brewers' grain is higher in fiber, which is beneficial in high energy diets. Corn gluten feed is an excellent energy source. Since both feeds are wet, guard against excessively wet rations (over 50 percent moisture) that can lower dry matter intake. Adding 1/4 to 1/3 pound of buffer (sodium bicarbonate) may be helpful.

Dairy cattle that need supplemental protein (that is, high-producing cows and growing heifers) would benefit the most from these high protein feeds. The level of added wet feed should be dictated by the amount of protein needed. Limit the level to 25 to 30 percent of the total ration dry matter for dairy cows, and keep moisture levels below 50 percent.

Costs must be a prime concern. One method of comparing the price is to use Morrison's feed constants. Multiply the energy constant by the price of shelled corn (value of energy in the feed), multiply the protein constant by the price of soybean meal (value of protein), and add these two values together. If you can buy the wet feed delivered to your farm for less than this price, it's a good buy.

- Brewers' grain (20 percent dry matter)

  0.121 (energy constant) x $6 (price of shelled corn/100 lb) = $0.73

  0.081 (protein constant) x $13 (price of soybean meal/100 lb) = $1.05

  Value of 100 pounds wet brewers' grain = $1.78

  Value of ton of wet brewers' grain = $35.60

- Distillers' feed (40 percent dry matter)

  0.218 (energy constant) x $6 (price of shelled corn/100 lb) = $1.31

  0.208 (protein constant) x $13 (price of soybean meal/100 lb) = $2.70

  Value of 100 pounds of wet corn gluten feed = $4.01

  Value of a ton of wet corn gluten feed = $80.20

Producers should consider cost, ability to utilize the purchased nutrients, handling and feeding systems, and storage.

The 1984 Illinois Dairy Seminar

New dairy legislation, price supports, and advertising and promotion of dairy products will highlight the 1984 Illinois Dairy Seminar sponsored by the Illinois Milk Producers' Association, the Department of Dairy Science, and the Cooperative Extension Service. The noon-to-noon program is scheduled for January 3 and 4, 1984, at the Hi-De-Ho Motel in Carlyle.

Frank Vacca, Mid-America Dairymen, Inc., will be the keynote conference speaker. A panel composed of a lender, a dairy producer, and an agricultural Extension adviser will respond to Mr. Vacca's presentation on dairy legislation. Topics will also include the prevention

and control of mastitis by William Crist, University of Kentucky, Lexington, updating the genetic base for evaluating sires and cows by Roger Shanks, University of Illinois, Urbana-Champaign, and the use of computers on the dairy farm. Larry Werries, Director, Illinois Department of Agriculture will discuss the outlook for Illinois agriculture. For more details and information contact Wayne Scritchlow, Illinois Milk Producers' Association, 1701 Towanda Avenue, Bloomington, IL 61701, or call (309)557-3251. (R.V. Johnson, Extension Dairyman)

Hay Treatment to Hasten Drying

Yield and nutritive value of forage is influenced by harvesting and storage losses. Losses of forage dry matter and protein during field drying is related to the length of field exposure. These losses can exceed 30 to 40 percent after rainy, unfavorable weather. Storage losses are primarily due to microbial action and high moisture levels of hay placed in storage. Potentially, the mechanical or chemical treatment of forages can reduce the time taken to reach a dry matter (DM) content "safe" for storage and thus reduce total DM loss. Recent work at Michigan State University examined the effectiveness of chemical treatment in hastening the drying of cut alfalfa—reducing the interval from cutting to baling. It also measured the loss of DM and the chemical changes taking place during storage. At the time of cutting, a solution containing emulsified (0.25 percent emulsifier) methyl esters of long-chain fatty acids (2, 5, or 10 percent) and potassium carbonate was sprayed on alfalfa at cutting from two spray booms, one mounted in front and above the crimping rollers, and the other mounted behind and below the rollers of a mower conditioner. When control and treated windrows were baled at the same time after cutting, unsprayed control hay averaged 66 percent DM and sprayed alfalfa averaged 77 percent DM (Table 4). Spray treatment allowed hay to be baled 10 hours earlier. Loss of DM during storage was greater for control bales than for sprayed hay (9.4 compared with 2.7 percent). Mean temperature of bales during storage was also greater for control than treated forage. Chemical conditioning at cutting to hasten field drying can reduce the interval from cutting to baling, decreasing the risk of quality reduction by adverse weather. (E.H. Jaster, Dairy Management Specialist)

Table 4. Dry Matter (DM) Content at Baling, Bale Temperatures, and Loss of Dry Matter During Storage of Control and Sprayed Alfalfa

Treatment	DM % at baling[a]	Bale temperature during storage		Dry matter loss	Visual observations of hay after storage
		Peak	Mean		
		°F		%	
Control	65.9	117	94	9.4	Brown, with patchy white mold
Sprayed	77.1	94	76	2.7	Green, no mold

[a]Mean of three trials.

Dairy Judging Teams Have Successful Year

The results of various contests in which Illinois dairy judging teams participated are given below. We congratulate the teams on a very successful year.

University of Illinois Collegiate Dairy Judging Team

Members: Mark Deters, Quincy; Donn Fricke, Arenzville; Mark McGuire, Polo; Duane Olson, Kewanee; Chris Berning, Galena; Linda Borhart, Huntley; Dawn DeVries, Oregon; Jeff Elsas, Lincoln; and Scott Plocher, Pocahontas.

Coaches: Sidney Spahr and Gene McCoy

Contests: (1) National Intercollegiate Dairy Judging Contest, Madison, Wisconsin. Overall rank among 36 teams: 13th for all breeds; 2nd for Holsteins and 4th for Brown Swiss; (2) Midwest Intercollegiate Dairy Judging Contest, Waterloo, Iowa. Overall rank: 13th among 14 teams. (3) All-American Invitational Dairy Judging Contest, Harrisburg, Pennsylvania. Overall rank: 21st among 24 teams. (4) Mid-South Invitational Intercollegiate Dairy Judging Contest, Memphis, Tennessee. Overall rank among 21 teams: 13th for all breeds; 4th for Guernseys and 5th for Brown Swiss.

Illinois Senior 4-H Dairy Judging Team

Members: Julie Barker, Davis; James Butler, Chebanse; Jerry Gaffner, Greenville; and Ross Meinert, Davis.

Coach: Ralph Johnson

Contest: National 4-H Dairy Cattle Judging Contest, Madison, Wisconsin. Overall rank among 36 teams: 3rd for all breeds; 4th for Ayrshires; 5th for Brown Swiss; and 5th for giving reasons. Gaffner ranked 2nd in total score for all placings and reasons.

Illinois Junior 4-H Dairy Judging Team

Members: Joanne Hunt, Ohio; Steve Irwin, Beason; Bruce Lange, Centralia; and Doug Ratermann, Greenville.

Coach: Ralph Johnson

Contest: Mid-South Invitational 4-H Dairy Judging Contest, Memphis, Tennessee. Overal rank among 9 teams: 4th for all breeds; 3rd for Ayrshires and Brown Swiss; 4th for Holsteins; and 5th for Guernseys. Ratermann ranked 6th in total score for all placings and reasons.

Illinois State University Collegiate Dairy Judging Team

Members: Kurt Kunkel, Granville; Tim Kunkel, Granville; Robert Miller, Dawson; Aaron Moore, Normal; and Brian Puetz, Streator.

Coach: Clarence Moore

Contests: (1) Midwest Intercollegiate Dairy Judging Contest, Waterloo, Iowa. Overall rank among 14 teams: 1st for all breeds; 1st for Brown Swiss and Milking Shorthorns; 2nd for Ayrshires and Holsteins; and 3rd for giving reasons. (2) All-American Invitational Dairy Judging Contest, Harrisburg, Pennsylvania. Overall rank among 24 teams: 7th for all breeds; and 1st for Ayrshires. (3) Mid-South Invitational Intercollegiate Dairy Judging Contest, Memphis, Tennessee. Overall rank among 21 teams: 4th for all breeds; 1st for Jerseys; and 2nd for giving reasons. (4) National Intercollegiate Dairy Judging Contest, Madison, Wisconsin. Overall rank among 36 teams: 15th for all breeds; and 3rd for Ayrshires. (R.V. Johnson, Extension Dairyman)

Dairy Digest Renewal

Be sure to renew your subscription for the 1984 *Illinois Dairy Digest*. The

price is the same as it was last year ($4.50 for four issues). You must have received a renewal form in the mail.

Please return it with a check to LeAnn Topel, 126 Mumford Hall, 1301 West Gregory Drive, Urbana, IL 61801.

M.F. Hutjens, G.W. Harpestad, R.V. Johnson Extension Dairymen

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ILLINOIS DAIRY DIGEST
FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 13, Number 1 *February, 1984*

All-Breeds Dairy Conference to Be Held April 13 in Urbana

An All-Breeds Conference for Illinois dairy producers who raise registered dairy cattle will be held April 13, 1984, at Jumer's Castle Lodge, Urbana. Members of the Ayrshire, Brown Swiss, Guernsey, Holstein, Jersey, and Milking Shorthorn associations in the state will attend the conference.

Ewing H. Roe, Associate Editor, *Hoard's Dairyman*, will be the keynote speaker at the opening luncheon. His topic, "The Dairy Industry in the 80s: Problems and Opportunities" promises to be challenging and informative for Illinois dairy producers.

Mini-sessions, held concurrently after the opening program, will feature five topics. Each participant will have an opportunity to get the latest information on two of the following topics: Johne's disease, management practices to improve breeding efficiency, using the new genetic base for sire selection, component milk pricing, and feeding dairy cattle. For ladies not attending the regular sessions, there will be a special session on wardrobing. A tour of the University of Illinois Dairy Science farm is also being offered.

The conference is sponsored by the Illinois Purebred Dairy Cattle Association in cooperation with the University of Illinois Department of Dairy Science.

Advance registration, registration fees, and payment for meals are required by April 2. Write to R.V. Johnson, 315 Animal Sciences Laboratory, 1207 W. Gregory Drive, Urbana, IL 61801, or call 217-333-0636 for detailed information. (R.V. Johnson, Extension Dairyman)

Feed Strategies with the Dairy Milk Reduction Program

Many Illinois dairy producers have made the decision to participate in the 15-month milk reduction program. Contracted reductions vary from 5 to 30 percent based on 1981-82 milk production levels. Several "ideas" for reducing milk production have been suggested, but these can lead to trouble. Several key points to consider are listed below.

1. Grain and protein levels of feed for high-producing, early-lactation cows should not be cut. Although milk yield may drop, profitability (income above feed, fixed, and variable costs) will also drop. Genetically superior cows may try

to maintain milk yields, which will lead to thin cows, ketosis, cystic ovaries, fatty livers, and reproductive problems. Top-quality forage can support 9,000 to 11,000 pounds of milk, whereas low-quality forage will support 3,500 pounds of milk with no additional grain.

2. If you decide to reduce milk yield, lower grain intake in the second half of lactation (150 days postpartum). The lactation drive (cow's desire to produce milk) will decline, and by this time cows should be pregnant. Additionally, forage intake will be near maximum.

3. Guard against heavy or fat cows and heifers if you delay breeding, keep heifers open, or dry up cows early. Fat dairy cattle will have more metabolic and health disorders in the next lactation. Consider adding 6 grams of niacin to the ration of fat cows one week prepartum to 10 weeks postpartum.

4. If dairy heifers are going to be held open to calve after April 1, 1985, slow the growth rate after heifers have reached puberty (7 to 9 months of age). If nutrients are deficient in early life, heifers will be stunted. Normally, large breed heifers gain 1.6 pounds per day while small breed heifers gain 1.3 pounds per day. Slowing heifer growth may prevent them from fattening. Adjust energy and feed intake levels to match the protein levels and growth pattern desired.

5. Maintain a balanced and adequate mineral and vitamin program for all cattle. These nutrients are needed for microbial growth, body tissue, maintenance, cow health, and normal reproduction. If residue or low quality forages are fed, double check the level of key minerals and vitamins.

Producers must continue to feed good cows correctly to avoid long-term negative effects. Reducing cow numbers is more logical than reducing the milk yield of all cows. (M.F. Hutjens, Extension Dairyman)

Hay Marketing Conference

A fast-paced, informative forage program is scheduled for March 16, 1984, starting at 9 a.m. It will be held in the Junior Department Building, State Fairgrounds, Springfield, Illinois. Important topics are listed below.

- Trends in livestock production
- A look at handling forage
- Chemical hay drying agents
- Developing hay marketing cooperatives
- NIR, how it works
- Chemical preservation of alfalfa
- Transporting hay

Speakers from Wisconsin, Missouri, Michigan, and Illinois will provide the latest information. The preregistration fee is $6 ($8 at the door). Contact Larry Aldig (217-782-6675) for registration details. Plan to attend!

Using Ammonia to Improve Crop Residues Fed to Dairy Cattle

Feed shortages caused by drought or winter kill of perennial forages continue to plague dairy producers. A method both to improve the quality and to stretch your feed supplies for dairy heifers and dry cows involves applying anhydrous ammonia (NH_3) to baled crop residue (cornstalks, straw, and mature grass hay). The process includes applying the ammonia to bales stacked under a plastic covering.

Research in several states, including Illinois, has shown that ammoniating nonlegume crop residue improves both energy availability and protein content, leading to improved animal performance. Typically, digestible dry matter and crude protein concentrations

rose by 100 to 150 pounds per ton after treatment with 60 to 80 pounds of NH_3 per ton of dry matter. Results varied according to the type of residue and conditions of treatment. As a rule, ammoniation improves crop residue quality to the equivalent of low to medium quality hay.

Applying anhydrous ammonia to a stack of bales is relatively simple. All you need is a sheet of 6- to 8-mil plastic large enough to cover the stack, a reservoir, hose, regulator, and source of NH_3.

The size of the stack treated depends on your feed requirements but is realistically limited to the amount that can be covered by a 40 x 100-ft sheet of plastic. In round figures, this equals about 1,500 small, square bales or 70 large, round bales. The bales can be stacked directly on the ground, but it is better to stack them on a concrete slab or sheet of plastic. Choose a site that drains away from the stack.

As you stack the bales, place the reservoirs within the stack at equal distances from each other and from either end. The size and number of reservoirs required will depend on the amount of residue treated. About 20 percent of the liquid NH_3 injected will vaporize immediately. The rest will remain in the reservoir as a liquid, vaporizing over time.

Because ammonia weighs 5.14 pounds per gallon, you will need about 9.5 gallons of reservoir capacity for every ton treated at the recommended rate of 60 pounds per ton. For larger stacks, using two large watering tanks works well. Ammonia will corrode galvanized tanks, so use older ones and line them with plastic. For smaller stacks, 55-gallon barrels that are open at one end work well. Run a hose from each tank to a place outside the stack where it will be connected to a regulator. It is a good idea to weight the reservoir end of the hose with a brick since the NH_3 will be discharged under pressure.

After stacking the bales, cover them with plastic. This is easier to do on calm days and with the help of a few extra hands. Leave enough plastic around the edges so that you can weight it with crushed limestone, soil, or loose bales. If you stack on top of another sheet of plastic, roll the edges together before sealing. It is important to seal the stack tight enough to prevent ammonia loss. On large stacks, weight the top with a few loose bales or old tires to keep the wind from whipping the plastic.

Punch a hole in the plastic for each hose and pull the hose through it. Tie the plastic securely around the hose with a piece of twine. Connect the hose to the regulator and set it for a flow rate of 600 pounds per hour. Applying 60 pounds of ammonia per ton will require six minutes of flow for each ton of hay. The plastic will billow with pressure created by the vaporizing NH_3. Watch for leaks and patch them with duct tape as they occur.

After you treat the stack with NH_3, it must remain covered for a period of time to obtain the full benefit of the ammonia. Stacks treated at ambient temperatures above 60°F need three to four weeks; at lower temperatures, four to eight weeks. You should leave the stack covered until it is needed. However, it should be uncovered and aerated for at least 24 hours before feeding.

Remember that anhydrous ammonia is extremely hazardous to work with. Make sure all hose connections are tight. Wear goggles and gloves while handling the material, and keep plenty of water close by just in case. (K. Moore, Agronomist, and E. Jaster, Dairy Scientist)

How Does Your Breed Measure Up?

The average production of all first-lactation cows calving in 1982 and the

average predicted difference (PD) of their sires are reported below. Milk and fat yields were standardized for age, month of calving, length of lactation, and times milked per day (called 2X, 305-day, and M.E. records). This information, provided by the Animal Improvement Programs Laboratory of the USDA, shows the averages for the United States and Illinois for each breed (Table 1).

The average production of milk and fat of first-lactation cows calving in Illinois in 1982 was slightly lower than the average of all cows in the US. This indicates that Illinois dairy producers need to intensify the use of the best bulls available in each breed in order to keep pace with the genetic progress of the nation's dairy herd. (R.V. Johnson, Extension Dairyman)

Milk Diversion Program

When you signed up to participate in the 15-month milk diversion program, you made your first decision about that program. You now have to develop a plan so that you can meet your contract. Your total 15-month milk sales on March 31, 1985, must meet your contract. Several questions have been raised in this context.

When should I reduce milk yield?

The earlier the better would be recommended. Don't make major milk reductions in February or March 1985 when in April you'll need to be ready to compete under the new dairy legislation. You may also decide to reduce milk yield in the summer when heat and insect stress affect cows more. Be sure you are "ready to roll" in 1985.

When should cows be culled?

If you have identified several cows for culling, they should be culled when cows begin to lose money (when income above feed and variable costs is negative). You may cull profitable cows earlier if the extra milk is likely to jeopardize your contract later.

Should I calve out bred heifers?

Generally, the answer is "yes" since the heifer market value is probably

Table 1. National and Illinois Averages for Different Breeds

Breed		No. of records	Avg. production		Avg. PD of sires	
			Milk	Fat	Milk	Fat
			lb	*lb*	*lb*	*lb*
Ayrshire	US	4,788	12,843	499	+637	+22
	IL	118	11,826	462	+502	+17
Guernsey	US	12,911	11,558	535	+781	+30
	IL	366	10,867	504	+809	+31
Holstein	US	485,202	17,378	625	+978	+28
	IL	11,195	16,249	590	+962	+27
Jersey	US	27,542	11,584	553	+993	+34
	IL	291	10,465	492	+870	+26
Brown Swiss	US	6,775	14,293	571	+1,094	+35
	IL	352	13,251	527	+1,161	+37
Milking Shorthorn	US	897	11,912	440	+992	+41
	IL	57	11,496	438	+938	+43
Red and White	US	639	15,840	585	+107	+3
	IL	51	16,071	585	+106	+1

going to be beef price, female calves will be needed as replacement heifers in 1986, and genetically superior heifers can be identified and kept. A two-year old heifer will produce 10 to 15 percent less milk than when she is a mature cow. If you can legally sell bred heifers (to other producers in the program), consider that option too.

Will replacement heifers be a problem in 1986?

Yes, dairy managers should be aware that if they reduce cow numbers and delay heifers from calving, few dairy replacements will be available. Cull pressures may drop and only sterile, mastitic, or other problem cows replaced. By culling marginal cows this year, fewer replacement heifers will be needed in 1986. Maintain a sound calf-rearing program to avoid death losses.

Be sure you have an accurate and workable record system so you can monitor your current and future milk status. You must meet your government contract. *You must have a plan.* (M.F. Hutjens, Extension Dairyman)

Dairy Reports Available

Copies of the *1984 Illinois Dairy Report*, distributed at ten area dairy days, are available for $2 each through the Dairy Extension Office, 315 Animal Sciences Lab., 1207 West Gregory Drive, Urbana, IL 61801. The 40-page report includes summaries of the talks presented and the latest dairy research conducted at the University of Illinois.

M.F. Hutjens, G.W. Harpestad, R.V. Johnson Extension Dairymen

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 13, Number 2 *April, 1984*

Toxicity Problems with Ammoniated Dry Roughage

The treatment of dry roughage with 3 percent anhydrous ammonia increases the nutrient value of low quality roughages such as straw and late-cut grass hays. Unfortunately, several cases of toxicity with ammoniated forages have been reported in Illinois and other Midwest states.

In two trials conducted at the Fort Hays Experiment Station, Kansas, symptoms of toxicity (hyperexcitability, circling, convulsions, and death) were observed in newborn calves (1 to 14 days of age) nursing cows fed the ammoniated forage. Cases have also been reported in growing heifers and adult cows.

The primary forages were forage sorghum, sudangrass, cereal grain, brome, and fescue hay treated with ammonia. Higher quality forages appear more risky. No problems have been noted with ammoniated straw or other poor quality forages. Analysis of the affected forages have shown relatively high levels of imidazole compounds (produced in the affected forage by ammonia reacting with carbohydrates). Much more research is needed on the subject. The Illinois Diagnostic Laboratory, Centralia, is working on a case study. Anhydrous ammonia is a mold inhibitor, preservative, and source of nitrogen (converting to protein). At the same time, it improves forage digestibility. However, dairy producers should refrain from ammoniating high to medium quality forages or be aware of potential risks. (M.F. Hutjens, Extension Dairyman)

Economic Feed Alternatives

As grain and hay prices remain relatively high, dairy producers should consider all feed sources to keep feed costs at a minimum while maintaining optimal milk yield. Several feeds available in Illinois are discussed below.

Hominy feed is a by-product of the dry milling process. It consists of corn, corn germ, and part of the starchy portion of the corn kernel. Guaranteed analysis shows that hominy contains not less than 9 percent crude protein, not less than 4 percent fat, and not more than 7 percent crude fiber. One price

quoted was $111 per ton. Research at Pennsylvania indicates that hominy is equal to shelled corn in the dairy ration. Particle size is relatively fine and should be considered since it could affect flow characteristics in your feed system as well as palatability.

Wheat can be fed successfully to dairy cattle. Limit the level to 33 percent of the grain mixture (up to 50 percent of the grain mixture in total mixed rations). Feed processing is important to avoid powdery, fine, and dusty feed. If you can purchase wheat below $3.50 a bushel, it can be an economical alternative.

Barley is another grain that can be considered. If the price is lower than $3.20 per bushel, you can replace 50 to 100 percent shelled corn. The extra fiber can improve grain texture and fat (if fiber is limited). Rolling the grain is the most desirable form of processing.

High moisture wheat has been successfully stored in oxygen-limiting structures and fed in Minnesota. Ensile at 26-29 percent moisture. Roll the wet grain before ensiling. This feed can replace a portion of your corn and can be harvested earlier than dry wheat grain, allowing for an earlier double cropping and fewer risks from weather and lodging.

Wheat, barley, rye silage, or hay are excellent-to-average forage alternatives. When they are harvested in the boot stage, protein content can exceed the 15 percent needed for lactating cows. Small grain forage harvested in the dough stage will be of lower quality (10 percent protein and 50 percent TDN), which can be fed to dry cows and older heifers. Harvesting in the dough stage will increase dry matter yields over 50 percent. Be sure the moisture levels are optimal for your storage structure and situation. Since these forages are high in moisture content and drying conditions are not optimal, successful hay making is difficult.

Wet corn gluten feed and wet brewer's grain continue to be excellent buys if transportation costs are not excessive. Consider ensiling these wet by-products with forage to minimize spoilage losses.

To determine if any of these alternative feeds are a good buy, use these energy and protein constants.

Feed alternatives	Energy constant	Protein constant
Hominy feed	1.043	0.012
Wheat	0.839	0.140
Barley	0.908	0.093
Wet corn gluten feed	0.218	0.208
Wet brewer's grain (20% dry matter)	0.121	0.081

Multiply the energy constant by the price of 100 pounds of shelled corn. Repeat this for the protein constant, multiplying it by the price of 100 pounds of soybean meal. Add these two values together. If you can purchase the feed for less than this price, it is economical.

Example using wheat:

Energy = 0.839 x $5 per cwt	=	$4.19
Protein = 0.140 x $12 per cwt	=	$1.68
Value 100 lb wheat	=	$5.87
Value 60 lb bushel of wheat	=	$3.52

Being a sharp feed buyer will pay dividends in 1984! (M.F. Hutjens, Extension Dairyman)

Dehydrated Alfalfa for Lactating Cows

Dehydrated alfalfa (dehy) pellets have been used as a substitute for both forage and grain in diets for lactating cows. The protein in dehy is relatively resistant to microbial degradation in the rumen. Dehydrated alfalfa has a nutrient composition of 93 percent dry matter, 20 percent crude protein, 1.4

Main Effects of Replacing Alfalfa Hay with Dehydrated Alfalfa in the Dairy Ration

Increase in:	*Decrease in:*
Feed consumption	Rumination time
Concentration of ruminal volatile fatty acids	Saliva production
Proportion of organic matter digested postruminally	Ruminal pH
Flow of amino acids to the small intestine	Retention time in the rumen
Amino acid uptake from small intestine	Digestibility
Milk production	Ruminal acetate: proportionate ratio
	Percent milk fat

percent calcium, 0.26 percent phosphorus, and 35 percent acid detergent fiber (dry matter basis).

Lactation studies have examined the replacement of alfalfa hay with dehy in the dairy diet. Slight increases in milk production were observed in the studies. Milk fat was unaffected in two of the studies and depressed in the third. The report from Canada indicated dehy pellets may be used as a satisfactory replacement for half the dry matter from corn silage; however, milk fat percentage was reduced, milk yield was maintained, and milk protein increased.

Dehydrated alfalfa also has been used to replace grain in the dairy ration. A summary of recent lactation studies indicates that as much as 50 percent of the grain may be replaced with dehy without reducing milk yield. Percent milk fat was either unchanged or increased.

Research from Nebraska has demonstrated that protein in dehy is degraded in the rumen to a lesser extent than protein in alfalfa hay or in soybean meal. Small amounts (20-30 percent) of the protein in alfalfa hay or silage escape degradation in the rumen.

A recent Wisconsin summary of the potentially desirable and adverse effects when alfalfa is replaced by dehydrated alfalfa appears above. The decision to use dehy as a replacement for grain or forage or a source of protein in dairy rations must be based upon costs of alternative protein or energy sources. (E.H. Jaster, Dairy Management)

Forage Preservatives

A 1982 national survey of dairy producers found that 30.7 percent were using forage preservatives. The forages treated and a breakdown (in percent) of the users is given below.

	1982	1978
Hay silage	55.4%	67.5%
Corn silage	51.5%	63.6%
Baled hay	32.3%	Not available

As you consider each product and whether to apply it, you may find the guidelines on the next page useful. Mold inhibitors (such as acid products) will minimize heat damage and moldy feed. Uniform application is important. With wet haylage, enzyme or bacterial additions can direct the fermentation

Guidelines for Applying Forage Preservatives

Forage	*Moisture level*	*Type of product*
	PERCENT	
Baled hay	Over 22 (conventional bales)	Mold inhibitor
	Over 18 (big bales)	
Haylage	Under 35 (oxygen limiting)	Mold inhibitor
	Under 45 (conventional)	
	Under 55 (bunker or bag)	
Haylage	Over 60	Enzyme or bacterial additive

so that sour, strong-smelling, unpalatable forage is avoided. Producers should check research results, since product efficiency will vary with concentration of product, number of organ isms, level of addition, type of enzyme, and storage conditions. Use a product that will work at the moisture levels indicated above if you need a preservative.

Adding 50 to 100 pounds of a fermentable carbohydrate source (ground corn, rolled milo, dried molasses, or dried whey) will also improve the fermentation characteristics of hay silage. These feeds serve as a preservative and a source of additional nutrients. (M.F. Hutjens, Extension Dairyman)

After the Sign-Up?

The following article appeared in the *Western Regional Dairy Marketing Review*, Volume 8, Number 1. Final figures from Illinois indicate that 1,171 dairy producers signed up for the milk diversion program, diverting 22 percent of their base milk production. (M.F. Hutjens, Extension Dairyman)

While the official announcement reported only a 12 percent sign-up by dairymen, the facts indicate a greater level of participation than that figure suggests. Among those who are marketing milk commercially, the participation was somewhat higher. For instance, the dairymen who entered the program are estimated to have milked 19 percent of the nation's milk cows, and produced 22 percent of last year's milk supply.

While this level of participation is well below many of the predictions, it is not insignificant. The prospective reduction of 5.5 billion pounds of milk (based on the 1983 production by those participating) amounts to about 4 percent of our current annual rate of milk output. That should help.

Nevertheless, we believe the real key to the trend in this year's milk production lies elsewhere. The reactions of the 80 percent of the milk-producing industry which is not participating, coupled with the response by the users of dairy products will be more decisive.

Obviously the nonparticipating dairymen will be responding to the economics of their cost-price relationships. The question will be how these develop during the coming year. Additionally, those same economic conditions will be important to the postcontract plans of the participating dairymen. What can be expected of this group after March 1985?

WE BOUGHT TIME. Whatever else may be said about the current program, one of the primary results may be that it will buy further time for producer adjustment. Gaining time has often been a major strategy of leaders in the dairy industry, and one which sometimes has had much to recommend it.

Public, as well as producer attention has been focused recently on the contracting program. The question of what is happening to the incentive to produce milk has received less emphasis. If this distraction helps in gaining time for the conventional adjustment procedures to work, it will serve a worthwhile purpose.

The present course of events may also be welcomed by some in the administration. The lowered rate of returns for milk has been their major objective. That is now in place, and the many bitter complaints from producers about the withholding of money from their milk checks seems to have subsided. Furthermore, it appears that the 50 cents being taken by the government will pay for a major share of the nearly 1 billion dollars that the diversion payments are expected to cost. And on the other hand, if the contracting program did not prove highly popular, so be it. Not everyone hoped it would.

In summary, there is no apparent reason to believe the decrease in the net farm price for milk is not firmly in place for the entire period of the contracting program. If the resulting combination of prices and costs provides the incentive for a definite corrective trend, there will be widespread relief. We are among those who have advocated an approach which would allow for gradual adjustment. Based on our evaluation of near term price relationships, that may now be in the offing.

DAIRYMEN'S PROFITS SQUEEZED. It is not unrealistic to expect that the next few months may see a moderation in the flow of milk from many of the producers who did not enter into contracts, as well as from those who did. The growing cost-price squeeze will force some adjustments. Despite the continuing inflation, there has been no increase in milk prices for more than 40 months. In fact, net prices to dairymen have been trending downward for almost a year.

The support price was first established at $13.10 on October 1, 1980. It remained at that level for over three years despite increases in the price of most things dairymen buy. Estimates of the cost of producing milk as released by Oregon State University reflect a $1.23 per hundredweight gain in the cost of producing milk since October 1980. The parity index (prices farmers pay) as released by USDA has gained more than 15 percent over the same period of time.

Meanwhile, beginning last April 16, the return from milk was reduced below its 1981-82 levels through changes in the government's support program. Producers are expected to net approximately $1.00 per hundredweight less next month than they did a year earlier. The MW price, which either controls or reflects the rate of return to the vast majority of U.S. dairymen, was $12.05 for January, down $0.57 from the previous year. If we add to that drop the reducing effect of the 50-cent withholding, the average return for milk used in manufacturing was about $1.07 per hundredweight lower for January this year than for January 1983.

The January 31 milk-feed price ratio announced by USDA was $1.29 (after our adjustment for the 50-cent withholding). That figure was about 30 points below the previous January figure. That amounts to the most drastic *year-to-year reduction in price relationships in nearly 40 years. Additionally, it reflects the most unfavorable relationship between milk and feed prices since the severely depressed period of 1974-75, when postwar record low levels of milk-feed ratios were recorded.*

Nor have we seen the end of decreases in milk-feed ratios. The ratio for January was benefited by high butterfat tests, and by what might be considered an abnormally large Class I differential. January Class I prices under federal orders were based on the November MW price, which was the month before the support price was reduced.

Thus, the January difference between class I and class III prices was artificially enhanced. Class I prices dropped 45 cents in February, however, and they will continue at a somewhat lower level thereafter.

IMPROVED DEMAND. Also auguring for improvement in the supply-demand balance in the commercial dairy market is a more optimistic outlook for consumer demand. Indications are already in place that commercial disappearance will be better this year than last. Steady-to-moderate prices for dairy products, plus improvement in consumer incomes, have undoubtedly helped out.

Government removals of dairy products have fallen below year earlier levels at an increasing rate for eight consecutive weeks. (Data for the latest week available show a 23 percent decrease.) And the effects of the new promotion plan are yet to come.

UNCERTAINTIES. The major threat to a noticeable improvement in the market balance for dairy products is the possibility of bumper crops of grain and feed next fall. It is somewhat painful to contemplate the fact that abundant crops could extend the adjustment period for the dairy industry, but the possibilities are obvious.

And so the uncertainties continue. But unfortunately the uncertainty of the government's role continues to loom large. Hopefully, future programs will minimize this problem. (H. Alan Luke, Extension Economist, Washington Research Center)

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ILLINOIS DAIRY DIGEST

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Near Infrared Reflectance in Illinois

If tolerable soil loss levels are to be reached by the year 2000, 900,000 acres currently in row crops must be converted to conservation uses in Illinois. One way of effecting this change is to raise forage crops. Governor James Thompson and the Illinois General Assembly have approved $135,000 for the Illinois Quality Hay Program, the major purpose of which will be to analyze hay quality for sales and to balance livestock rations.

A mobile van equipped with Near Infrared Reflectance (N.I.R.) equipment will rapidly analyze forage by the use of light waves. The equipment will measure crude protein, acid detergent fiber, insoluble crude protein, digestible dry matter, calcium, phosphorus, potassium, and neutral detergent fiber. Results of an analysis can be obtained in 10 minutes or less. Wet labs take two days, plus mailing time and back delays, to do the same work.

Illinois dairy producers will receive more details later this fall when the Illinois mobile van is scheduled for delivery. This unit will be similar to the Wisconsin mobile van that has appeared at several forage events in Illinois. The project is being coordinated by the Illinois Department of Agriculture, Division of Marketing, in cooperation with the Illinois Cooperative Extension Service, the Illinois Hay Association, and the Illinois Forage and Grassland Council. This new technology offers great promise for the Illinois agricultural industry. (M.F. Hutjens, Extension Dairyman)

Organic Acid Hay Preservatives

Organic acid hay preservatives are very effective and relatively easy to use. The organic acids most commonly used are propionic acid and propionic:acetic acid (80:20) mixtures. Recommended treatment rates (dry matter basis) for these acids are 10 pounds per ton for hay baled at a moisture concentration between 20 and 25 percent, 20 pounds per ton for hay with 25 to 30 percent moisture, and 30 pounds per ton for hay with 30 to 35 percent moisture.

A number of products that are marketed as hay preservatives contain organic acids. The amount of acid in these products varies from 10 to 100 percent. Treatment rates given above are based on products containing 100 percent organic acid. Therefore, diluted products must be applied at higher rates if the equivalent amount of active ingredient is to be obtained. Read product labels carefully to find out how much organic acid each contains, and make price comparisons on the basis of cost per pound of acid.

Organic acids can be mixed with water up to a ratio of 1:1 without loss of effectiveness. Diluting the acid will allow for a more uniform coverage of

the hay but will also make it necessary to increase the output to apply the correct amount of active ingredient.

Equipment available for application of organic acid preservatives generally consists of a storage tank, pump, spray nozzles, flow meter or pressure regulator, and plastic tubing. The storage tank and pump can be mounted on the tractor or directly on the baler. The nozzles should be suspended over the pick-up reel and adjusted so that the hay is uniformly covered as it enters the baler. Most dealers who sell preservatives also sell the equipment necessary to apply them.

To apply the required amount of acid, you must determine the baling capacity of your machinery (tons per hour) and then adjust your spray equipment to deliver the correct amount of acid (pound per hour). To determine the baling capacity of the baler, (a) bale for three minutes, (b) count the bales made, (c) weigh several bales, and (d) calculate the average bale weight in pounds.

The baling capacity in tons per hour can then be calculated using the following formula:

$$\text{Baling capacity (ton/hr)} = \frac{\text{number of bales} \times 20 \times \text{average bale weight (lb)}}{2{,}000}$$

The required output of preservative per hour is equal to:

$$\text{Required output (lb/hr)} = \text{Desired treatment rate (lb/ton)} \times \text{baling capacity (ton/hr)}$$

The pressure regulator and nozzles must be adjusted to deliver the required output of preservative per hour. The output for each pressure-nozzle combination can be readily checked by determining the number of seconds required for one nozzle to fill a 1-pint bottle.

$$\text{Output (lb/hr)} = \frac{450 \times \text{wt. of product (lb/gal)} \times \text{no. of nozzles} \times \% \text{ acid}/100}{\text{seconds/pint}}$$

The weight of a gallon of preservative varies with the type of acid(s), the amount of acid, and the amount of water it contains. If the exact weight is unknown, a figure of 8 pounds per gallon is a reasonable estimate.

Organic acids are potentially hazardous, and safety precautions listed on the product label should be read and followed closely. Protective clothing, rubber gloves, and goggles should be worn whenever the acid is handled. Operators should wear a respirator to avoid breathing drift during application. A supply of water to rinse the skin and eyes should be readily available in case an accident occurs. Baking soda mixed with water can be used to neutralize the acid.

Organic acids are very corrosive and will remove paint from baling equipment. Machinery should be cleaned after each use by baling a few untreated bales. Surfaces exposed to the acid should then be rinsed with water. (K.J. Moore, Forage Agronomist, and E.H. Jaster, Dairy Management Specialist)

Your Dairy Promotion Program

As part of the national milk reduction program, 15 cents per hundredweight of milk sold was withheld from each producer's check to increase advertising and promotion of dairy products. A panel of dairy producers was selected to determine how these funds would be used. Ardath DeWall of Ogle County was selected from Illinois. Four areas of concern have been identified, and nearly 50 million dollars have been committed.

Area 1. Cheese continuity advertising (24 million dollars).

Cheese is one dairy product for which sales have increased.

Emphasis will be on increasing processed cheese sales, competing with imitation cheese, and promoting new varieties and uses of cheese.

Area 2. *Young adult fluid milk advertising* (11.5 million dollars).

Thirty-seven percent of dairy product sales is of fluid milk, and two-thirds of this amount is consumed by people under 35. Emphasis will focus on its good taste, its nutritional value, and its identity as a modern and "asked for" beverage.

Area 3. *Children fluid milk advertising* (5.5 million dollars).

Children between 6 and 12 consume 26.8 gallons of milk per year. Emphasis will feature kids feeling good about dairy products (with music, action, entertainment, and repetition) and developing a pattern of using dairy products at a young age.

Area 4. *Butter advertising* (6 million dollars).

About 19 percent of milk is marketed as butter, but it only has 28 percent of the spread market (4.4 pounds per capita as compared with 11.7 pounds of margarine). Emphasis will be on its superior quality, uniqueness, naturalness, and use in casual settings.

The results of the national effort will be evaluated in the spring of 1985. Funds will also be used to evaluate the dairy promotion program, to conduct the national referendum, and to pay administrative costs. (M.F. Hutjens, Extension Dairyman)

The Cost of Producing Milk, 1982-1983

The cost of producing milk on Illinois record-keeping farms for 1982 and 1983 is shown in Table 1. When feeds fed, including home-grown grain, silage, and hay, are valued at the average market prices (opportunity cost) and added to the nonfeed costs, the total is now greater than the price received for milk (see return above all costs). These data show that dairy producers will need to take less for their fixed costs in labor and buildings and interest on capital. Producers able and willing to do this will continue to produce. But those unable to take less for these fixed costs because of debt obligations or living needs may be forced to consider business adjustments until a better milk supply-demand situation returns.

Business adjustments may include such alternatives as (1) increasing milk production per cow through better management of herd health, nutrition, feeding according to production, and selection of breeding sires, (2) postponing capital improvements to hold down interest costs, and (3) cutting costs wherever possible, including substituting low-cost or higher-quality feeds when available. Note that feed makes up 43 to 47 percent of the total cost of production.

These data are summarized from Illinois farm business records. About 60 percent of the farms with 40 to 80 cows and 40 percent of the farms with over 80 cows were located in northern Illinois; the remainder were in southern Illinois. About 60 percent of all the herds in both groups are located in northern Illinois. The primary difference between northern and southern Illinois farms is that herd size averages are larger, building costs are lower, and the average milk price tends to be

higher in the St. Louis milkshed area. These farms represent an estimated level of management that is slightly above the average of all farms of similar size and type.

The total production costs were accounted for by being allocated to crops or the dairy enterprise; dairy was the only livestock produced on these farms. On all farms, over 40 percent of the crop value produced was fed to dairy. Average grain farm costs in 1982 and 1983 were used to establish the crop costs. The balance of the total farm costs was allocated to the dairy enterprise. To obtain the net cost of producing milk, each cost item for the total dairy enterprise was first reduced proportionately by the income received from the beef produced using the 1979-1983 average price received for all cull cows and vealers sold. The total cost per cow for the small herd group in 1983 was $2,404; the average beef income was $302, leaving a net cost of $2,102 per cow for milk production. Thus, each cost item was reduced by 13 percent (Table 1).

The larger herds had higher milk production per cow and 60 to 70 cents per 100 pounds of milk produced ($80 to $100 per cow) more return above all cost for management. Most of this difference is due to a lower fixed cost per cow in labor and buildings. The labor cost includes both the unpaid operator labor charge and the cash cost paid for labor hired. (D.F. Wilken, Farm Management Extension Specialist)

Dried Corn Gluten Feed

Wet corn gluten feed has been fed by many Illinois livestock producers this year, and results have been excellent. Now, dried corn gluten feed is another alternative to consider. The price is currently around $80 per ton at the point of production. Transportation costs are lower per unit of dry matter because it is 90 percent dry matter as compared with the 40 percent dry matter of wet corn gluten. Thus, the transportation cost is halved. In addition, storage and handling problems in hot weather are minimized since it is a dry feed. The disadvantages of dry gluten feed include reduced palatability (cattle like the wet product) and lowered digestibility (85 percent of the wet product).

Dairy producers should compare the economics of both feeds, be sure that cattle can use the energy and protein provided by the feed, and consider a supplemental noncorn source of protein (such as soybean meal) for high-producing cows to avoid amino acid imbalances. With profit margins tight, corn gluten feed may reduce your purchased feed costs. (M.F. Hutjens, Extension Dairyman)

Table 1. Cost and Returns to Produce Milk, by Size of Enterprise, Illinois, 1982 and 1983

	40-79 cows in herd		80 or more cows in herd	
	1983	1982	1983	1982
	150 farms	134 farms	61 farms	48 farms
Average per farm				
Tillable acres	290	266	408	409
Number of cows	59	60	107	105
Milk per cow, pounds	14,349	13,639	14,857	14,477
Beef per cow, pounds	581	564	602	628
	per cow in herd			
Costs, milk plus beef	$2,404	$2,199	$2,406	$2,273
Less average returns from beef	302	291	325	330
Net cost for milk	$2,102	$1,908	$2,081	$1,943
Return from milk	1,815	1,774	1,869	1,882
Return above all costs	$ -287	$ -134	$ -212	$ -61
Return above cash cost	$ 511	$ 632	$ 548	$ 706
	per 100 pounds of milk produced			
Cash costs				
Feed	$ 6.70	$ 6.15	$ 6.56	$ 5.77
Operating expenses				
Maintenance and power[1]	$ 1.22	$ 1.14	$ 1.21	$ 1.24
Livestock expense	.86	.78	.87	.84
Insurance, taxes, and overhead	.31	.30	.25	.27
Total operating expenses	($ 2.39)	($ 2.22)	($ 2.33)	($ 2.35)
Total cash costs	$ 9.09	$ 8.37	$ 8.89	$ 8.12
Other costs				
Depreciation[2]	1.25	1.23	1.08	1.04
Labor	1.97	1.99	1.70	1.76
Interest charge on all capital	2.32	2.40	2.19	2.39
Total all costs	$ 5.54	$ 5.62	$ 4.97	$ 5.19
Total nonfeed costs	$ 7.93	$ 7.84	$ 7.30	$ 7.54
Total all costs	$14.63	$13.99	$13.86	$13.31
Milk price received	$12.65	$13.01	$12.58	$13.00
Return above all costs	$-1.98	$ -.98	$-1.28	$ -.31

[1]Includes utilities, machinery, equipment and building repairs, machine hire, and fuel.
[2]Includes machinery, equipment, and building depreciation.

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FACTS FOR LAND OF LINCOLN DAIRYMEN

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Illinois Dairy Days: Managing in "Normal" Times

Dairy farmers looking back at 1983 and 1984 can consider dairy-operating conditions in these years to be "normal." Dairy producers will continue thus to face tight profit margins. To help producers manage their dairy operation more efficiently during 1985, a series of ten Dairy Day programs have been scheduled for January throughout Illinois.

The first Dairy Day is set for January 14 in Kankakee. Sponsored by the University of Illinois Department of Dairy Science and the Cooperative Extension Service, this year's theme will be "Managing during Normal Times."

Stan Smith, UIUC Extension area dairy adviser will focus on economic and management alternatives in his presentation, "Life after the Dairy Programs." Gene McCoy, UIUC dairy scientist, will talk about minimizing feet and leg stress in confinement housing. In addition, Mike Hutjens, UIUC Extension dairy specialist, will discuss replacement heifer strategies and opportunities.

A question-and-answer session will conclude each program. Six of the Dairy Days meetings will feature commercial displays. The new Illinois mobile near infrared reflectance (NIR) forage testing van will be testing hay samples at several locations to accurately evaluate forage quality.

The scheduled dates and locations of the 1985 Illinois Dairy Days are as follows:

January	
14	Kankakee, Redwood Inn
15	Marengo, Cloven Hoof Restaurant
16	Freeport, Masonic Temple
16	Elizabeth, Community Building
17	Sterling, Emerald Hall Country Club
18	Pekin, Agricultural Center
22	Quincy, Farm Bureau Building
23	St. Libory, American Legion Hall
24	Breese, American Legion Hall
25	Teutopolis, Knights of Columbus Hall

Registration for each program will begin at 10:15 a.m., and the presentations will start at 10:30. A registration fee of $3 will cover the cost of proceedings for each farm unit represented. Lunch will be available at cost.

More information about the 1985 Dairy Days is available from your County Cooperative Extension Service Office.

Update on Liquid Feeding for Calves

A successful heifer-rearing program results in more heifers for herd replacements, greater culling, and additional income from the sale of surplus breeding

stock. The first four weeks of a calf's life are critical. Several new products or management tips were reported recently.

University of Minnesota

During the cold winters of 1983 and 1984, calves raised in calf hutches died from starvation even though they received recommended levels of milk solids. Minnesota researchers have developed guidelines for compensating calves stressed by cold weather. These researchers recommend the following:

- Feed 10 percent more feed (milk or milk replacer) for every temperature drop of 10°F below 30°F.
- Increase the number of feedings to 3 times a day when temperatures are below 0°F.
- Limit the maximum feed increase to levels of 50 percent above normal.

Adjustments for wind chill should be considered. Dairy managers using hutches or cold housing may want to consider this system.

Kansas State University

Prestarter is a dry, pelleted feed, similar to milk replacer (22 percent protein and 12 percent fat, made from dried whey and skim milk). The pelleted prestarter allows for early weaning and earlier rumen development, and reduces scouring. Program guidelines are listed below.

- Feed colostrum for 3 days.
- Add 1/2 cup of prestarter in the milk bucket with whole milk or top quality milk replacer when the calf is 4 days old.
- Topdress 1/2 cup of quality calf starter with 1 cup of prestarter.
- Wean calves when 1 to 1 1/2 pounds of dry matter are consumed.
- Offer water free-choice.

Weaning calves at 2 to 4 weeks of age has been successful even in cold weather hutch conditions. The prestarter is commercially available.

Commercial Research Reports

- Acidified milk replacer is a new product commercially available in the Midwest. Because the milk replacer is acidic, calves eat smaller quantities at each meal but eat more frequently. This allows producers to feed milk replacer free-choice, using one nipple for each pen (typically 4 to 6 calves per pen). Initial research reports indicate improved gains and less scouring. However, there are some disadvantages: (1) more milk powder is consumed per calf (raising costs); (2) sanitation becomes crucial; and (3) disease problems can result from housing calves in groups.
- In another commercial research study, soy flour was chemically modified to improve digestibility. Growth response was equal to that achieved from an all-milk based milk replacer and was somewhat less expensive. Scouring was also reduced, which may be related to the higher fiber, change in microbial population in the large intestine, or lactose dilution. Review feed tags carefully since this product is higher in fiber, a quality usually associated with a poor milk replacer. (M.F. Hutjens, Extension Dairyman)

The 1985 Illinois Dairy Seminar

Discussion of component milk pricing, advertising and promoting dairy products, and possible new dairy legislation will highlight the 1985 Illinois Dairy Seminar sponsored by the Illinois Milk Producers' Association, the Department of Dairy Science, and the Cooperative Extension Service. The noon-to-noon

program is scheduled for January 2 and 3, 1985, at the Holiday Inn in Freeport.

Ardath DeWall, member of the National Dairy Promotion and Research Board, will discuss the priorities and programs of the board's advertising and promotion efforts. A representative of the advertising firm handling the campaign and the program director of the American Dairy Association will explain their strategies and how they coordinate their efforts.

Component milk pricing will be explained by Raymond Cragle, University of Illinois, Urbana-Champaign. Carl Zurborg, manager, Swiss Valley Farms County, and Frank Belt, dairy producer, will discuss their views on component pricing. "The National Dairy Program: Where to from Here," is the title of a presentation to be made by Susan Fridy, lobbyist, National Milk Producers Federation.

Topics will also include the use of record-keeping systems as a tool for survival by dairy producers; "Focus on Forages" (by Rick Walgenbach, USDA Forage Research Center, Madison, Wisconsin); and an explanation of a dairy leadership conference. Dr. John Campbell, Dean, College of Agriculture at the University of Illinois, Urbana-Champaign, will be the featured speaker at the banquet.

For more details and information contact Wayne Scritchlow, Illinois Milk Producers' Association, 1701 Towanda Avenue, Bloomington, IL 61701, or call (309) 557-3251. (R.V. Johnson, Extension Dairyman)

Dairy Cattle Judging Teams Have Successful Year

The results of various contests in which Illinois dairy judging teams participated are given below. We congratulate the teams on a very successful year.

University of Illinois Collegiate Dairy Judging Team

Members: Chris Berning, Galena; Linda Borhart, Huntley; Dawn Devries, Oregon; Jeff Elsas, Lincoln; Mark Knief, Burlington; Karl Lawfer, Kent; Lori Long, Geneva; Curtis Newport, Poplar Grove; Scott Plocher, Pocahontas; Doug Raterman, Greenville; Melvin Stoll, Chestnut; and Ron Wilke, Okawville.

Coaches: Sidney Spahr and Gene McCoy

Contests: (1) Midwest Intercollegiate Dairy Judging Contest, Waterloo, Iowa. Overall rank among 15 teams: 9th for all breeds; 1st for Guernseys; 4th for Jerseys; and 5th for Brown Swiss. (2) All-American Invitational Dairy Judging Contest, Harrisburg, Pennsylvania. Overall rank among 22 teams: 13th for all breeds, and tied for 1st for Brown Swiss. (3) Mid-South Invitational Intercollegiate Dairy Judging Contest, Memphis, Tennessee. Overall rank among 18 teams: 4th for all breeds; 2nd for Jerseys; and 5th for giving reasons. (4) National Intercollegiate Dairy Judging Contest, Madison, Wisconsin. Overall rank: 14th among 36 teams. (5) North American Invitational Dairy Judging Contest, Louisville, Kentucky. Overall rank: 4th among 13 teams.

Illinois Senior 4-H Dairy Judging Team

Members: Steve DeWall, Shannon; Joanne Hunt, Ohio; Steve Irwin, Beason; and Tim Van Acker, Huntley.

Coach: Ralph Johnson

Contest: National 4-H Dairy Judging Contest, Madison, Wisconsin. Overall rank: 12th among 36 teams.

Illinois Junior 4-H Dairy Judging Team

Members: Patrick Kunkel, Granville; Laura Lalor, Hebron; Victor Lenkaitis, Granville; and Kerry Wolff, Mason.

Coach: Ralph Johnson

Contest: Mid-South Invitational 4-H Dairy Judging Contest, Memphis,

Tennessee. Overall rank among 9 teams: 4th for all breeds; 2nd for Jerseys; 3rd for Brown Swiss; and 5th for Guernseys and giving reasons.

Illinois State University Collegiate Dairy Judging Team

Members: Roger Fluegel, Lena; Larry Kolstedt, Naperville; Bob Miller, Dawson; Jay Mohr, Lexington; John Mohr, Lexington; and Dean Zierer, Hampshire.

Coach: Clarence Moore

Contests: (1) Midwest Intercollegiate Dairy Judging Contest, Waterloo, Iowa. Overall rank among 15 teams: 12th for all breeds; 4th for Milking Shorthorns. (2) All-American Invitational Dairy Judging Contest, Harrisburg, Pennslyvania. Overall rank among 22 teams: 19th for all breeds; 3rd for Ayrshires. (3) National Intercollegiate Dairy Judging Contest, Madison, Wisconsin. Overall rank: 16th among 36 teams. (R.V. Johnson, Extension Dairyman)

Dairy Digest Renewal

Be sure to renew your subscription for the 1985 *Illinois Dairy Digest*. The price is the same as it was last year ($4.50 for four issues). You must have received a renewal form in the mail.

Please return it with a check to Leann Topel, 126 Mumford Hall, 1301 West Gregory Drive, Urbana, IL 61801.

M.F. Hutjens G.W. Harpestad, R.V. Johnson Extension Dairymen

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ILLINOIS
DAIRY DIGEST
FACTS FOR LAND OF LINCOLN DAIRYMEN

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By-Product Feeds

Illinois dairy producers who wish to replace protein supplements, grain, or forage with a more economical substitute should consider using by-product feeds. These feeds are produced when cereal grains are processed for human consumption or for manufacturing purposes. They are a "good buy," and if you are located near the source of production, their costs can be even lower. Several such products are described below.

Malt Sprouts

Form: Dry pellet feed
Source: Barley
Nutrient value: 19% crude protein, 1.5% fat, 67% TDN, 15% crude fiber, 0.21% calcium, and 0.54% phosphorus
Use: Grain extender with extra fiber
Value (per ton): $114 delivered
Price quote (per ton): $80 f.o.b.
Comments: Limit the amount to 20 percent of the grain mixture.

Soybean Hulls, Mill Feed, or Flakes

Form: Dry grain
Source: Soybeans
Nutrient value: 12% crude protein, 78% TDN, 39% crude fiber, 1.7% fat, 0.45% calcium, and 0.17% phosphorus
Use: Forage or grain extender
Value (per ton): No formula available (estimated $80 per ton)
Price quote (per ton): $60 f.o.b.

Dried Distillers' Grain

Form: Dry feed
Source: Shelled corn
Nutrient value: 30% crude protein, 88% TDN, 10% fat, 0.16% calcium, and 0.79% phosphorus
Use: Protein source with low rumen protein degradability
Value (per ton): $134 delivered
Price quote (per ton): $110 to $160 f.o.b.
Comments: Avoid dark-colored feed (heat damage)

Corn Gluten Feed

Form: Dry (meal or pelleted) and wet feed
Source: Shelled corn
Nutrient value: 21% crude protein, 86% TDN (wet) or 82% TDN (dry), 9% crude fiber, 4% fat, 0.10% calcium, and 0.60% phosphorus
Use: Energy and protein source
Value (per ton): $124 dry or $55 wet delivered
Price quote (per ton): $40 (wet) and $90 (dry) f.o.b.
Comments: The dry product should be gradually introduced in the diet because it is not very palatable. Limit the wet material to 25 percent of the total ration dry matter.

Brewers' Grain

Form: Dry or wet feed
Source: Barley
Nutrient value: 26% crude protein, 66% TDN, 16% crude fiber, 5% fat, 0.29% calcium, and 0.54% phosphorus
Use: Protein source with low rumen protein degradability; and also forage extender
Value (per ton): $40 wet or $121 dry delivered

Price quote (per ton): $28 (wet) or $97 (dry) f.o.b.

Comment: Limit the wet feed to 25 percent of the total ration dry matter. Be aware that two moisture levels are available (70 and 80 percent moisture brewers' grain). Wet values listed are for 30 percent dry matter brewers' grain.

Other feeds that may be a good buy for your dairy include whole cottonseed, soybeans, hominy feed, and corn gluten meal.

Before deciding, producers must consider the following factors with reference to the by-product they select:

- economics
- handling characteristics
- storage problems (if product is wet)
- correct substitution in the dairy ration

The values calculated for the feeds listed were based on Morrison feed constants, with shelled corn priced at $5 and soybean meal at $9 per 100 pounds. Because profit margins will be tight in 1985, producers should consider lowering feed costs as an economy measure. (M.F. Hutjens, Extension Dairyman)

1985 Illinois Dairy Report

If you could not attend one of the 1985 Area Dairy Days, you can receive a copy of the proceedings for $2.00; send a check payable to the Dairy Extension, 315 Animal Science Laboratory, 1207 W. Gregory Drive, Urbana, IL 61801. The first section discusses calf and heifer management, minimizing foot and leg stress, and economic alternatives for 1985. The last half of the 44-page booklet summarizes all the recently completed dairy research at the University of Illinois (such as electronic feeders, double crop forages, protected amino acids, cloning, and colostrum quality).

European Programs and Milk Surpluses

[The following article was published in the *Western Regional Dairy Marketing Review* (Vol. 8, No. 3) in November 1984. It appears below with slight editorial modifications.]

A long-standing complaint of U.S. dairy farmers involves the cheese and other surplus European dairy products being imported into the United States. There is concern that such products are being dumped onto markets here with the aid of subsidies from the governments of the exporting countries, while the European Economic Community (EEC) effectively insulates its markets from U.S. competition. But the current price relationships raise some interesting questions concerning the issues of product availability and trade barriers.

It is true that the European Economic Community subsidizes exports of dairy products to many nations outside the community. The EEC has become by far the largest source of dairy products on the world market. It is also true that its domestic milk prices have been supported through a so-called intervention program. The huge outlays by the EEC for its various farm price support programs have in fact, seriously threatened the Community's financial solvency. About 75 percent of its total budget has gone for these programs, and milk prices have received the lion's share of this subsidy.

It is true furthermore that EEC markets are carefully shielded from any imported product that might cost importers less than "threshold" prices, which are rather stiff. And all of the foregoing facts strongly suggest another truth, namely that EEC milk prices have been maintained at levels above those which would otherwise have prevailed in a freely competitive market. What is *not true*, however, is that the British and most other EEC dairy farmers are receiving prices that would appear attractive to dairymen in this country. They are lower than ours. Some prices are much lower.

We will pass up the interesting question as to what level of milk prices would have prevailed in EEC countries if there

had been no governmental intervention program. It is not likely that the answer to this will ever be known, but the price would certainly have been lower. What we can know, however, is the prices now being paid to European dairy farmers. In Britain for instance, the approximate average price for this year is expected to be about $7.25 per hundredweight.

It appears obvious that the outlook for the United States in competing effectively with Europe in expanding commercial exports for dairy products is not bright. Exchange rates are not likely to change enough to compensate for the differences in the price of dairy products. The picture could change if the EEC quota plan is used to cut production to the point that no excess products are available for export. This plan might please EEC's taxpayers, but it is certainly not imminent. Any change of this or another nature would need to be accompanied by a substantial increase in world market prices to be of much help to U.S. dairymen, assuming that our current level of price supports is to be maintained, at least approximately.

If a significant increase in world dairy product prices is to take place, governments or institutions exercising nationwide monopolistic powers must forego the use of taxpayers' money or other of programs that elevate domestic prices to levels that stimulate production unnecessarily and discourage consumption. It is usually such programs that have created the demand for disposal of surpluses through subsidized international "marketings," a process commonly referred to as "dumping."

The changes necessary to eliminate international dumping may not be possible in a world full of politically operated supply-management programs. If changes are not possible, the beneficiaries of the low-priced trade in dairy products will continue to receive this form of assistance. In the minds of many, the cost to taxpayers and consumers in the exporting countries may be viewed as reasonable, considering the stability achieved for their domestic dairy industries. Nevertheless, the failure to establish freely competitive markets results in a net overall loss to the country's economy, the extent of the such loss depending on the skill with which the programs are managed.

The role of our own country in this picture will be influenced to a large degree by our attitude toward noncommercial (or subsidized) exports. In recent years the U.S. government has tended to shy away from anything that might be viewed as product dumping. Charitable and other forms of domestic disposals have been preferred. The other alternative is to control surpluses in the first place through price adjustments or possibly by direct production control measures, which are being referred to quite often recently by the more acceptable term, "supply management." The struggle over the choice between price adjustment and management will no doubt highlight the upcoming legislative actions involving the 1985 farm bill. (H.A. Luke, Extension Economist, Washington State University)

Replacement Heifer Nutrition and Management

Rearing dairy herd replacement animals is a long-term investment in feed, labor, and other resources if producers want high-quality replacements for the lactating herd. A recent report from various cooperating universities outlined current research on replacement nutrition and management. Much research has focused on feeding and management of the young calf. Illinois researchers conducted an experiment to determine whether commercially available feed flavors of butter (B), milk aroma (MA) or maple (MP) would influence feed consumption or growth when added to milk replacer or starter rations of calves. No effect of flavor added to milk replacer was noted on starter consumption for calves as compared with animals fed control diets. When flavor MP was added to starter ration, however, more intake occurred from 6 to 8 weeks, compared with control calves. Average daily gains

to 8 weeks were greater for calves fed starters flavored with MA (0.95 lb) or MP (1.0 lb) than calves fed control diets (0.80 lb).

Utah researchers fed newborn calves one of three rations: (1) chopped alfalfa plus regular concentrates; (2) chopped alfalfa hay plus regular concentrate with whole cottonseed at a ratio of 3:1; and (3) no hay and the same concentrate mix as in ration 2. Weight gains (net gain for 12 weeks) were greater for calves fed ration 2 (103.8 lb) and ration 3 (108.2 lb) than for control fed calves (91.3 lb) but were not significantly different. No ration effects were noted on weight, volume, and tissue thickness of rumen compartments.

Penn State Workers studied the effects of adding sodium bicarbonate (3 percent) to diets of dairy calves to see whether this would improve performance when calves were fed high-energy diets that varied in percentage of protein. The addition of sodium bicarbonate stimulated greater growth, preweaning, and a higher feed intake for the 10-week trial, although most improvements of performance appeared immediately pre- or postweaning. (E.H. Jaster, Dairy Management)

Monensin for Replacement Heifers

If dairy replacement heifers are not growing at an optimal rate (1.6 pounds per day for large breed heifers or 1.3 pounds for small breed heifers), consider adding monensin to your rations. Monensin (the commercial name is Rumensin) is an antibiotic that enhances feed utilization by selecting the optimal rumen microbes to digest feed. Monensin also is a coccidiostat (controls internal parasites). The product was recently cleared by the FDA for dairy heifers.

The recommended level is 200 milligrams (mg) per day, starting when heifer body weight reaches 400 pounds. Feed monensin continuously until calving. During the first 5 days, limit heifers to 100 mg per day so they can adjust to the product. Withdraw monensin from the diet at calving since it is *not* legal to feed to lactating cows. Monensin clears the digestive system in 48 to 72 hours. It must be purchased as an ingredient in a carrier feed (mineral, protein, or grain mix) from a local feed dealer.

Economically, the cost-benefit ratio is 1:12. Monensin will cost $5 (for 417 days) or 1.2¢ per head per day. University researchers from New York, Pennsylvania, and Kansas report 12.1 to 13.4 percent improvement in feed efficiency and 8.1 to 12.4 percent improvement in gain. This resulted in 38 fewer days to calving with an associated savings of $62 in feed and nonfeed costs. No detrimental effects were observed on conception, calving ease, milk production, or fat test.

Producers should consider monensin if poor-quality forages are fed, if grain levels can be lower, if feed supplies are short, or if growth rates are not optimal. (M.F. Hutjens, Extension Dairyman)

The Illinois Dairy Industry

With the final phase of the Milk Diversion Program ending, a January 1985 summary of Illinois DHI herds reveals some interesting facts that dairy managers should review.

	1984
Number of cows	55
Milk yield per cow (lb)	14,805
Fat test (%)	3.89
Average days dry	67
Calving interval (days)	403
Services per conception	1.8
Percent of cows in milk	84
Average days in milk	170
Average age (months)	51
Heifers (over 12 months)	35
Heifers (under 12 months)	23
First lactation cows	17

On the basis of the number of 1984 first-lactation cows and young heifers (under 12 months of age), the number of older heifers (over 12 months) is higher than normal. This fact indicates that heifers may not have been bred at normal times

and held open to calve after April 1 1985. Calving interval and days dry are also high--both of which reflect a change in breeding strategies. The trend can be explained if these values represent shifts made by the 1,171 participants in Illinois to comply with the Milk Diversion Program. However, these shifts will seriously affect profitability. Review your values to determine if you will be competitive in 1985. (M.F. Hutjens, Extension Dairyman)

Junior Calf Sale: April 13

The 37th Annual Junior Calf Sale will be held at the University of Illinois Stock Pavilion, Urbana, beginning at 11:00 a.m. on Saturday, April 13, 1985. 4-H, FFA, and breed association junior club members will be the only eligible buyers at the sale and must certify that the calves will be used for dairy projects.

The Illinois Purebred Dairy Cattle Association sponsors the sale to help junior dairyproducers obtain high-quality animals for their projects. Catalogs will be available at county Extension offices and vocational agriculture departments about March 8. Catalogs will also be available from R.V. Johnson, 315 Animal Sciences Laboratory, 1204 W. Gregory Dr., Urbana, IL 61801. (R.V. Johnson, Extension Dairyman)

1984 Illinois DHI Milk Yields

Breed or type	Herds (no.)	Milk (lb)	Test (%)	Fat (lb)	Product value ($)
Ayrshire	13	12,170	3.9	478	1,522
Brown swiss	35	12,508	4.1	512	1,595
Dairy goat	16	1,822	3.9	71	592
Guernsey	28	10,958	4.6	499	1,475
Holstein	1,008	15,169	3.7	562	1,845
Jersey	25	9,728	4.7	459	1,394
Milking shorthorn	3	11,469	3.7	420	1,326

M.F. Hutjens, G.W. Harpestad, R.V. Johnson Extension Dairymen

ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

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After March 31

The 15-month milk diversion program that ended last month was considered a success by participants. The following results were achieved because of the program:

- Milk production in 1984 was reduced 3 percent nationally.
- Milk cow numbers dropped by 600,000, to below 11 million.
- The government saved one billion dollars by not purchasing 8.4 billion pounds of milk.

The program was self-supporting, with dairy farmers contributing $700,000,000 and the program paying out $500,000,000 plus handling charges. Dairy producers are now wondering what lies ahead. The program could not be extended as some milk cooperatives requested because (1) at the time of the initial program request, no option to come back or extend the diversion program was offered; (2) the U.S. dairy industry is regionally divided in opinion on future programs; (3) no hearings were held in March; and (4) some livestock associations are concerned about the impact on red meat prices.

At the Tri-State Dairy Days held in mid-March near Dubuque, Iowa, Dr. Robert Cropp, agricultural economist at the University of Wisconsin, Plattville, discussed the issue of future dairy legislation. Some of the questions he addressed, along with his answers, follow.

Will the milk support program be dropped? Probably not, but it will not be maintained at high levels.

Will quotas be instigated? Probably not since it is not popular in Washington, limits new farm entry, and develops economic value. On a recent tour of Canada, it was observed that the Canadian milk quota for one cow was selling for $7,000.

Will a safety net program be instituted? Probably yes, since it would avoid large price drops (such as $2 to $3 per hundredweight) over a short period, which would occur if a safety net were not in place.

Will the parity base be replaced? Probably yes, with a specific dairy parity that would be more sensitive to the actual costs of producing milk.

Will the government purchases (through CCC) continue? Probably yes.

Will the new program be flexible? Yes, supply-demand adjustments, the discretion of the Secretary of Agriculture, price deficiencies, and CCC purchases are possible alternatives.

Might a target price payment be instituted? Possibly, but . . . .

Could a paid diversion program be reinstituted? Maybe, but . . . .

Is there a government budget limitation? One billion dollars could be the maximum.

Dairy farmers should continue to monitor proposed legislation and be heard through their Congressional representatives, milk marketing organizations, and dairy

organizations. Farm budgets, cash flow projections, and profit statements should be reviewed and evaluated. (M.F. Hutjens, Extension Dairyman)

Isoacids for Milking Cows

Isoacids are a mixture of short chain volatile acids (isobutyrate, isovaleric, 2-methylbutyric, and valeric acids) found in the rumen. Adding these acids to the diets of dairy cows appears to stimulate the growth of fiber-digesting bacteria and to increase the synthesis of amino acids in the rumen. University researchers have reported an increase of 4 to 6 pounds of milk per cow per day from cows fed isoacids in the diet. An initial lag period (4 to 6 weeks) was noted before the milk yield response occurred. The recommended level is 0.19 pounds of product (containing isoacids) per cow per day. The acids have a strong odor, but cows consume the product readily. Not all trials show increased milk yields, but 85 percent of tested cows have shown an average of 5 pounds more milk per day over the entire lactation curve. Stressed cows do not respond and may exhibit depressed milk yield when given isoacids. Cows in early lactation have demonstrated higher milk yield responses. The product is safe, has no health or reproductive side effects, and has been cleared by FDA to be fed to lactating dairy cows. Contact with the concentrated form of isoacids on hands and clothing will result in a lingering odor and should be avoided. Wash thoroughly after handling. Avoid contact with eyes, as it may cause irritation. The product is not corrosive in the dry form and is stable in feed rations. No milk residues have been measured at four times the recommended level. The cost of the product is expected to be 15¢ to 25¢ per day or a cost-to-benefit ratio of 1:2. The brand name will be Isoplus™ and the product will be available in Illinois this summer through agents for Eastman Kodak Company. (M.F. Hutjens, Extension Dairyman)

Heat Stress

The cold weather and snow have disappeared, and summer heat stress on dairy cattle is just around the corner! As temperatures exceed 30°C (86°F), feed intake dramatically drops by 10 to 25 percent. Every one-pound decrease in ration dry matter represents a potential loss of 2 pounds of milk. Florida researchers found that blood flow to the rumen decreased 30 percent as the cow attempted to supply more blood to peripheral body areas to reduce body heat. Researchers assume that as a result, nutrient absorption in the rumen would also decline. The shift in blood supply could explain why reproductive performance also decreases under heat stress. Energy use for higher respiration rates and maintenance increases by 25 percent. In addition, hormonal shifts (decrease in the growth hormone) and lower vitamin A levels in the blood can result from heat stress. The following management tips can help reduce heat stress problems for your cattle.

- Provide natural or artificial shade to reduce heat stress.
- Cool cows with cool air, spray mists, or fans.
- Maintain feed intake by feeding during cooler times of the day and night.
- Add sodium bicarbonate (1 percent) and potassium (up to 1.2 percent) to the total ration dry matter.
- Keep silage palatable by feeding frequently to minimize secondary fermentation in feed bunks.
- Provide plenty of fresh, cool water.
- Avoid low-quality forage since it produces more digestive heat.
- Maintain fiber levels to avoid fat test drops.
- Monitor forage and grain intake.

Common sense and "heat" management strategies should improve and maintain milk and reproductive performance. (M.F. Hutjens, Extension Dairyman)

Table 1. Milk Response of Cows Fed Buffers in Normal and Fat-Depressing Diets during the First 12 Weeks of Lactation

	D.M. intake (lb)	Milk (lb)	Test (%)	4% FCM (lb)
Normal diet				
Control	39.7	73.6	3.72	70.6
Bicarb	42.3	76.9	3.81	74.6
SC	42.8	75.2	3.94	74.6
Fat-depressing diet				
Control	44.6	75.4	3.36	68.0
Bicarb	45.9	74.2	3.75	71.1
SC	46.6	73.7	3.81	71.2

Sodium Sesquicarbonate for Dairy Cows

A new buffer feed additive will appear shortly in Illinois. Sodium sesquicarbonate (the trade name will be S-Carb™) consists of sodium bicarbonate (37 percent) and sodium carbonate (47 percent) plus other minerals.

University studies comparing sodium bicarbonate (bicarb) and sodium sesquicarbonate (SC) show that both additives increased milk yield (pounds of 4 percent fat-corrected milk) in normal and fat-depressing diets (Table 1).

With regard to price, the SC additive is estimated to be 10 to 20 percent cheaper than bicarb. Both products are added at the same level (1/4 to 1/2 pound per cow per day in early lactation). No palatability comparisons have been reported. SC has a needle-like crystalline form compared with bicarb, which is like a powder. SC is currently marketed by FMC Corporation. (M.F. Hutjens, Extension Dairyman)

Evaluating Your Lactation Curves

Identify deficiencies in your feeding or management program by comparing your DHI herd values to those listed in Tables 2 and 3.

The values were based on results from Mid-State DHI Holstein herds for 1984. Similar values are available for other breeds on request. Summit milk is the average of the highest two milk yields recorded on DHI during the first three tests. Persistency refers to the ability to maintain the milk production pattern over time. It is calculated at three different periods in the lactation curve (less than 100 to 200 days, and greater than 200 days). (M.F. Hutjens, Extension Dairyman)

Table 2. Mid-States Holstein, First Lactation Cows

Rolling herd average	Summit milk yield	Days in milk		
		<100	100-200	>200
pounds	*pounds*			
<12,000 (actual:10,577)	40.2	36.9	32.0	26.9
13,000-13,999	47.7	44.3	39.3	32.9
15,000-15,999	53.2	49.5	44.5	37.6
17,000-17,999	58.7	55.2	50.2	42.2
>17,000 (actual:19,062)	63.0	58.5	54.7	45.9

Table 3. Mid-State Holstein, Second and Greater Lactation Cows

Rolling herd average	Summit milk yield	Days in milk		
		<100	100-200	>200
pounds		*pounds*		
<12,000 (actual:10,577)	51.8	47.9	37.2	26.6
13,000-13,999	63.0	58.8	46.4	32.2
15,000-15,999	70.9	66.9	53.0	36.3
17,000-17,999	78.4	74.0	58.8	40.3
>17,000 (actual:19,062)	85.0	80.2	64.7	43.2

The information given in this publication is for educational purposes. Reference to commercial products or trade names does not constitute an endorsement by the University of Illinois and does not imply discrimination against other similar products.

M. F. Hutjens, G. W. Harpestad, R. V. Johnson Extension Dairymen

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 14, Number 3 *October 1985*

FARAD

The Food Animal Residue Avoidance Databank (FARAD) is a multistate project funded by the USDA Extension Service Residue Avoidance Program (RAP). FARAD tailors its responses to specific requests from the several distinct publics it serves--livestock producers, Extension specialists and veterinarians, state and federal agencies, and other individuals involved in food animal residue avoidance.

FARAD provides the following types of information:

1. Trade names of all compounds approved by the FDA for use in food animals; indexed by generic drug, species, withdrawal time, and indications for use.

2. Generic drug data.

3. Allowable levels for feed additives; the tissue, milk, and egg tolerances for the food animal species.

4. A list of all RAP projects; materials developed by each project; with information accessible by species, drug, or any other parameter.

5. A current literature evaluation on pharmaco- and toxicokinetics of the chemicals listed.

6. A bibliographic file of literature on the kinetics of drugs in food animals.

Three Regional Access Centers (RACS)--located in Florida, Illinois, and California--can access FARAD. Requests for information or help in reducing residue problems should be directed to the center for your area. The Illinois site is the Animal Poison Control Center, University of Illinois, College of Veterinary Medicine, Urbana, Illinois 61801, (217)333-3611. (M.F. Hutjens, Extension dairyman.)

Hay Outlook

Illinois hay production for 1985 is estimated at 3.97 million tons, up 3 percent from 1984 and 45 percent from 1983. With alfalfa yield forecast at 3.9 tons per acre, all other hay is forecast at 2 tons per acre.

Illinois hay prices have dropped from $80 per ton in July 1984 to $57 per ton in June 1985. Overall, though, U.S. hay prices have risen $16 per ton in 1985--to $68 per ton. And, in contrast to Illinois, both Wisconsin and Minnesota hay are in short supply--with dry weather severely reducing the yields of their second and third cuttings. In fact, prices of $90 to $100 per ton have been reported in Minnesota. Because of this

Table 1. Minnesota DHI Scorecard for Holstein Cows, 1984 Performance

Management factors	Milk yield per cow per year, pounds 12,000 to 13,000	14,000 to 15,000	18,000 to 19,000
Summit milk, first lactation, pounds[a]	45	50	63
Summit milk, second lactation, pounds[a]	59	67	85
Cows culled, percentage	33	34	39
Grain fed per cow per year, pounds	5,052	5,331	6,182
Mastitis, percentage testing positive	37	31	22
Heat detection index, percentage	42	45	52
Days to first breeding, days	89	86	84
Days dry over 70 days, percentage	35	30	19
Sire I.D. First lactation, percentage	46	66	91
Conception rate, percentage	60	58	57
PD $[b], service sire	$ 70	$ 75	$ 84
PD $[b], cow's first lactation	$ 6	$ 11	$ 29

[a]From the Midwest Processing Center; Minnesota uses peak milk.

[b]Predicted difference dollars.

ready market, Illinois producers are advised to harvest their last cuttings.

As would be expected, top quality forage commands a top price--making forage testing a sound investment when advertising and selling hay. Either the Illinois Department of Agriculture forage-testing van or a commercial lab can provide forage-testing services. (M.F. Hutjens, Extension dairyman.)

Evaluating Your Herd

Minnesota researchers summarized factors that significantly affected milk yield (Table 1). To discover weak lines in your herd, compare your values with theirs. (M.F. Hutjens, Extension dairyman.)

Costs to Produce Milk

Illinois dairy producers continued to show "red ink" in 1984, according to figures summarized by University of Illinois agricultural economists in cooperation with the Illinois Farm Business-Farm Management Association. Individual records tabulated were from farmers enrolled in the FBFM record-keeping and business analysis program.

A detailed breakdown by herd size of 1984 milk production costs and returns for dairy farms is shown in Table 2. Farms included had no other livestock, with all costs accounted for either in crops or in the dairy enterprise. Total costs for the dairy enterprise were reduced by income from sales of dairy animals or from an inventory increase in pounds of beef produced during the year. The value of the added pounds was figured at the average price received for all weights of dairy animals sold in the past five years. The residual costs--88 percent of the total enterprise costs--were the net cost of producing milk. The feed cost includes on-the-farm grains evaluated at average Illinois market prices for the year, with corn at $3.12 per bushel and oats at $1.89. Commercial feeds were listed at actual cost, hay and silage at farm values, and pasture at 40 cents per animal per pasture day.

Herds with more than 80 cows not only produced more milk per cow but did so more cheaply. Compared with herds of 40 to 80 animals, larger herds produced

Table 2. Costs and Returns for Illinois Dairy Enterprises, by Herd Size, 1984

	40 to 80 cows per herd	More than 80 cows per herd	All units
Number of farms	132	45	177
Average tillable acres per farm	303	470	345
Average number of cows per farm	57.9	106.8	70.3
Average milk per cow, pounds	14,356	14,856	14,483
Average beef produced per cow, pounds	541	594	554
Costs per cow, milk plus beef	$ 2,437	$ 2,413	$ 2,431
Average returns from beef	292	305	295
Net costs for milk per cow	2,145	2,108	2,136
Return from milk per cow	1,784[a]	1,885[a]	1,810[a]
Return above all cost	$ -361	$ -223	$ -326
Cash costs per 100 pounds of milk produced,			
Feed	$ 6.81	$ 6.69	$ 6.78
Operating expenses,			
Maintenance and power	$ 1.31[b]	$ 1.37[b]	$ 1.32[b]
Livestock expense	.89	.94	.90
Insurance, taxes, and overhead	.33	.25	.32
Total operating expenses	$ 2.53	$ 2.56	$ 2.54
Other costs per 100 pounds of milk produced,			
Depreciation	$ 1.36[c]	$ 1.31[c]	$ 1.35[c]
Labor	1.94	1.65	1.87
Interest charge on all capital	2.22	2.04	2.17
Total other costs	$ 5.52	$ 5.00	$ 5.39
Total nonfeed costs per 100 pounds of milk produced	$ 8.05	$ 7.56	$ 7.93
Total all costs per 100 pounds of milk produced	$ 14.86	$ 14.25	$ 14.71
Net price received per 100 pounds of milk produced	$ 12.43	$ 12.69	$ 12.50
Return above all costs per 100 pounds of milk produced	$ -2.43	$ -1.56	$ -2.21

[a]ACSC payments for government dairy reduction program were not included.

[b]Includes utilities, machinery, equipment and building repairs, machines hired, and fuel.

[c]Includes machinery, equipment, and building depreciation.

an additional 500 pounds of milk per cow. For each 100 pounds of milk produced, the large herds also averaged 12 cents lower feed costs, 29 cents lower labor costs, and 18 cents lower interest charges.

The trend in total costs and returns per cow for all herds is given from 1981 to 1984 (Table 3). When cash and noncash costs are figured, the profit margin (return above all cost) declined--from $-115 in 1982 to $-320 per cow in 1984.

Table 3. Costs and Returns per Cow for Illinois Dairy Enterprises, 1981 to 1984

	1981	1982	1983	1984
Number of farms.....	201	182	211	177
Number of cows.....	...	72	73	70
Net cost for milk, per cow..	$1,963	$1,918	$2,096	$2,130
Return from milk, per cow...	1,834	1,803	1,831	1,810[a]
Return above all costs, per cow.....	$ -129	$ -115	$ -265	$ -320
Price received per 100 pounds of milk.....	$13.23	$13.01	$12.63	$12.50
Price received per 100 pounds of beef.....	$52.73	$47.30	$45.64	$43.92
Milk produced per cow, pounds.....	13,862	13,860	14,496	14,843

[a]ASCS payments for government dairy reduction program were not included.

Payments received by farms on the dairy diversion program are not figured into the average milk price received, as listed in Table 3. Farms in the Agricultural Stabilization and Conservation Service (ASCS) program recover a small part of their losses. Participation rates varied with herd size--with 33 percent of the smaller farms and 9 percent of the larger farms receiving payments.

Milk and beef prices have been going down, costs have been rising. And, while the higher milk production per cow has helped hold down cost increases per 100 pounds of milk produced, the feed costs from 1981 to 1984 have been relatively high. Lower corn and protein prices expected in the latter half of 1985 should lower feed costs by more than 20 percent, lowering by $1.50 per pound of milk the total cost to produce milk. If this happens, feed costs will drop from 46 percent of the total cost to produce milk in 1984 to about 40 percent of the total in late 1985 and in 1986.

The production cost difference between large and small herds--87 cents per 100 pounds of milk produced for 1984--is expected to increase or continue about the same. Increased milk production per cow--through better management--combined with the ability to spread labor and other fixed costs over more units of production, is making the larger herds more competitive. But, like most other livestock farmers, the dairy farmers who have large amounts of unpaid family labor and who use little borrowed money can best withstand long periods of negative profit margins. (D.F. Wilken, Extension farm management specialist.)

Dairy Promotion Dollars

Promotion is a solid investment--a proven way to expand and build markets needed for the future. The National Dairy Promotion and Research Program made it possible for the first time for every producer in the nation to contribute to the same promotion program and work on the same goal: selling more milk products.

Approximately $200 million was generated for the largest-ever agricultural commodity promotion program. About $80 million was retained at the national level, and the remaining money--aproximately

$120 million--went to the 83 qualified state or regional promotion, research, or nutrition education programs.

A strong record of progress and achievement is visible from the program's start-up year. In several ways it is evident that producer monies were spent prudently and effectively. Highlights include:

- After 30 years of declining consumption and several recent years of no growth, commercial sales of dairy products in 1984 were up almost 3 percent--an increase of $3\frac{1}{2}$ billion pounds of milk equivalent. UDIA, the nation's largest dairy promotion organization, is projecting another 3 percent increase for 1985.

- Manufactured products registered impressive gains for 1984: butter sales were up 4 percent; American cheese sales up 11 percent; other types of cheese sales up 7 percent; nonfat dry milk sales up 14 percent.

- More than 1,200 fluid milk, cheese, and dairy calcium ads were aired on network television between September 1984 and April 1985, placing dairy farmers in the top 40 network TV advertisers. Plus print ads were sponsored in major national magazines like *Time*, *Newsweek*, *People*, and *Reader's Digest*.

- A hard-hitting advertising campaign improved women's attitudes and awareness about the health benefits of dairy foods. For example, between October 1984 and February 1985, the percentage of adult women who agree "milk is a better source of calcium than most other foods" rose from 37 to 46 percent. Mature women who agreed strongly that dairy products have more nutrition per calorie than most foods increased from 26 to 38 percent.

- Greater cooperation and coordination is being seen. Consider this summer's ice cream program, which is the beginning of an exciting new kind of joint venture. It will be the biggest ice cream promotion ever, teaming up $6.5 million of dairy farmer's seed money from the National Dairy Board and state and regional promotion organizations and $8 million from ice cream manufacturers.

- Addressing longer-term objectives, 62 research projects are being funded to develop new products and processing methods, and gather more information on calcium's role in the diet.

Overall, National Dairy Board funds have been channeled into outlets yielding direct returns to milk producers. Over 80 percent has been put into advertising and less than 3 percent into administration.

But statistics can't tell the entire story. There is a much greater sense of confidence in our ability to promote dairy products. Dairy ads are being seen during Super Bowl and World Series broadcasts, top-rated TV programs, and in the most widely read magazines. Exposure never before possible is being achieved daily. (Ira Rutherford, *Dairy Digest*.)

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

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1986 Area Dairy Days— Staying Competitive

Mark your calendar now and plan to attend the 1986 Illinois Area Dairy Day nearest you. An information-packed program will develop this year's theme, "Staying Competitive." Topics to be discussed are "Nutritional Strategies with a Phase-Feeding Concept," Mike Hutjens; "Make Your Milking Herd Work for You," Dave Fischer; and "Developing a Herd Somatic-Cell-Count Reduction Program," Dave McQueen.

The dates and locations of the meetings are listed below:

January 13--Kankakee, Redwood Inn
January 14--Marengo, Cloven Hoof Restaurant
January 15--Freeport, Masonic Temple
January 15--Elizabeth, Community Building
January 16--Sterling, Emerald Hill Country Club
January 17--Pekin, Agricultural Center
January 21--Quincy, Farm Bureau Building
January 22--St. Libory, American Legion Hall
January 23--Breese, American Legion Hall
January 24--Teutopolis, Knights of Columbus Hall

Commercial booths will be on display at the Freeport, Sterling, Quincy, St. Libory, Breese, and Teutopolis locations. Come early to see the latest in agribusiness and available services. The $3 registration fee includes the *1986 Dairy Report*.

Meetings will begin at 10:30 a.m. except at Elizabeth, where the program will be switched to afternoon. (M.F. Hutjens, Extension dairyman.)

Coproduct Alternatives

Coproducts, or by-products, continue to change in availability and price. Depending on their situation and needs, dairy managers must be ready to shift, drop, or add a coproduct. Several currently popular coproducts are discussed below.

Dry corn gluten feed is a marginal buy at $80 to $90 per ton f.o.b. The break-even price is $102, figuring corn at 4.5 cents per pound and soybean meal at 7 cents. Prices for dry corn gluten feed are expected to drop in early 1986. For either wet or dry forms, recommended levels remain at 25 percent of the total ration dry matter.

Whole cottonseed can be a good choice because the extra fat and fiber are pluses. Prices quoted in central Illinois were $120 a ton for bulk purchases and $150 a ton for bagged seeds. The recommended feeding level is 5 to 7 pounds per cow per day. Only cows that are high producers of milk should be fed whole cottonseed.

With supplies currently tight, both *wet and dried brewers' grains* are good buys if you can find them and if you are close to the source providing the wet grain. Price quotes were $21 per ton for wet and $63 per ton for dried brewers' grains. Both feeds are excellent buys at these prices.

Wheat middlings, which consist of portions of the embryo, flour, and outside wall, have varied in price from $60 to $70 per ton f.o.b. The break-even price is $97, delivered to the farm. If you use wheat midds, limit them to 5 pounds per cow per day.

In general, coproducts continue to be economical alternatives in Illinois; but dairy farmers must watch prices. (M.F. Hutjens, Extension dairyman.)

Forage Quality in Illinois

A summary of the forage samples analyzed by the Illinois NIR (near infrared) forage-testing van reflects the variation in quality of Illinois forage. The van's service is sponsored by the Illinois Department of Agriculture.

For purposes of this summary, the state was divided into three regions: north of I-80, from I-80 to I-70, and south of I-70. The results are summarized in the accompanying table. (David Mees, Illinois Department of Agriculture.)

Table 1. Forage-Testing Summary from the Illinois NIR Van (through July 1985)

	Composition[a], average percent							
Sample type	CP	DM	ADF	NDF	DDM	P	K	Ca
Northern region								
Legume hay	17.1	84.1	33.8	51.8	62.6	.28	3.37	1.09
Grass hay	13.4	78.5	40.0	59.0	57.7	.26	2.83	0.81
Mixed hay	15.3	84.8	37.6	57.7	59.6	.26	3.06	0.93
Haylage	18.2	50.6	39.5	49.6	58.1	.34	3.48	1.02
Corn silage	8.2	45.6	28.5	...	66.7	.27	1.38	0.31
Central region								
Legume hay	16.8	84.9	34.9	53.3	61.7	.27	3.27	1.10
Grass hay	10.6	84.6	39.1	63.2	58.4	.26	2.27	0.63
Mixed hay	15.2	84.6	36.0	55.9	60.8	.26	3.14	0.96
Haylage	15.7	54.7	40.8	53.3	57.1	.30	2.94	0.82
Corn silage	8.2	42.0	28.7	...	66.5	.23	1.58	0.19
Southern region								
Legume hay	16.3	84.1	36.2	54.3	60.7	.25	3.23	1.08
Grass hay	10.5	87.5	39.5	62.9	58.1	.24	2.40	0.68
Mixed hay	14.0	83.1	38.4	59.8	59.0	.26	2.91	0.84
Haylage	15.5	49.1	37.5	49.5	59.7	.30	2.87	0.86
Corn silage	8.2	40.6	27.8	...	67.2	.22	1.56	0.18

[a]All results are expressed on a 100 percent dry matter basis. CP = crude protein; DM = dry matter; ADF = acid detergent fiber; NDF = neutral detergent fiber; DDM = digestible dry matter; P = phosphorus; K = potassium; Ca = calcium.

Feeding Isoacid

Illinois dairy farmers will have the option to feed isoacids (branched-chain volatile fatty acids), which can improve both fiber digestion and microbial protein synthesis in the rumen. Since November 1, commercial feed companies and cooperatives have been distributing the product under the trade name ISOPLUS.

Producers considering this product should note the following:

- The feed additive is relatively expensive, 25 to 30 cents per cow per day. A response of 2 to 3 pounds more milk per day will be needed to break even.
- A 30- to 60-day lag period occurs from the time isoacids are begun until an economic response occurs. In a large field study in Michigan, the cows' production increased 1.4 pounds the first month after feeding was started; 2.9 pounds after 2 months; and 4.2 pounds after 3 months.
- Generally, response has been positive in university and field studies, with 85 percent of the herds and trials showing increases in milk. However, 15 percent did not improve.
- The manufacturer recommends discontinuing isoacids 220 to 250 days after calving because the economic response is marginal at this time.
- Made of volatile fatty acids such as propionic and butyric acid, the product has a unique, strong odor that people find disagreeable.
- A greater response may be expected for animals fed a corn-and-silage-based diet with normal to below normal protein levels. Isoacids are produced naturally in the rumen from protein degradation.
- Response of first-calf heifers has been economically marginal, at 2.5 pounds more milk.
- The exact action by which milk yield increases 5 to 6 pounds per cow per day is not clear.

Dairy managers should consider these points and monitor economic responses in their herds when using isoacids. (M.F. Hutjens, Extension dairyman.)

Illinois Dairy Judging Team Results

Illinois 4-H and collegiate dairy judging teams completed a successful year. The team members, coaches, and results of various contests are listed below:

Illinois Senior 4-H Team was ranked 16th of 35 teams at the National 4-H Contest in Madison, Wisconsin. Members: Laura Lalor, Hebron; Pat Kunkel, Granville; Vic Lenkaitis, Granville; and Kerry Wolff, Mason. Coach: Mike Hutjens.

Illinois Junior 4-H Team placed first among 9 teams at the Mid-South Invitational Contest in Memphis, Tennessee. Members: Lynn Lenschow, Sycamore; Randy Anderson, Witt; David Irwin, Lincoln; and Kevin Wendling, Altamont. Coach: Mike Hutjens.

University of Illinois Collegiate Team placed 18th among 32 teams at the National Intercollegiate Contest in Madison, Wisconsin; 15th of 19 teams at the Pennsylvania All-American Contest in Harrisburg, Pennsylvania; 13th of 13 at the Midwest Invitational Contest in Waterloo, Iowa; and 11th of 12 at the North American Contest in Louisville, Kentucky. Members: Crystal Miller, Dundee; Dana Serven, St. Augustine; Mark Knief, Burlington; Doug Ratermann, Greenville; Karl Lawfer, Kent; Ron Wilke, Okawville; Jim Butler, Chebanese; Carol Heise, Neponset; and

Rod Delost, Canton. Coaches: Sid Spahr and Gene McCoy.

Illinois State University Collegiate Team placed 8th among 13 teams at the Midwest Invitational Contest in Waterloo, Iowa; 7th of 13 at the Mid-South Intercollegiate Contest in Memphis, Tennessee; and 25th of 32 teams at the National Intercollegiate Contest in Madison, Wisconsin. Members: Robert Crawford, Lockport; Dori Dowson, Auburn; Roger Miller, Lanark; and Steve Myers, Augusta. Coach: Clarence Moore. (M.F. Hutjens, Extension dairyman.)

Looking Ahead to A.D. 2000

The dairy picture in the United States will change by the year 2000, and dairy managers must be ready to meet these challenges.

Annual milk consumption will increase to 600 pounds of milk and milk equivalents. Current consumption is 580 pounds. The annual average milk production per cow in the United States will increase 250 pounds--100 pounds based on genetic improvement and 150 pounds based on improvements in feeding and management.

By the year 2000, the national production average will be 16,300 pounds of milk per cow. If growth hormone is used with full adoption, the average milk yield could be more than 20,000 pounds per cow. This increase in milk yield will reduce the number of dairy cows from the current 11.1 million to 7.8 million. Average herd size will increase from 60 to 90.

The number of dairy farms will drop to 88,000--half the current number; and 8 to 10 million fewer acres of land will be needed for feed production.

Regional variation will occur in the United States dairy enterprise. Dairy farming is in a dynamic and challenging transition. (M.F. Hutjens, Extension dairyman.)

Research Updates

Highlights of recent research results are summarized below. If you want more information on any topic, please contact us.

Iowa State University. Genetic changes were measured on 440,702 Holstein males and 526,956 Holstein females. For 1971 to 1979, the annual change for females was +121 pounds of milk, +3.3 pounds of milk fat, and -0.007 percent milk fat. Estimates for males were +185 pounds of milk, +5.8 pounds of milk fat, and -0.006 percent milk fat. Greater progress occurred through sire selection.

North Carolina State University. Teat-end shape was related to somatic cell count (SCC), based on scores from 898 Holstein cows. The figures obtained were as follows:

Teat-end shape	Front teats	Rear teats
	---SCC (100 cells/ml)---	
Pointed.....	326	355
Round.....	347	364
Flat.....	419	398
Disk.....	530	465
Inverted.....	509	679

As distance from the udder to the ground decreased (deep udder), SCC increased. Cows with faster milking rates also had higher SCC. If milk can be removed faster because the streak canal is large, it is reasonable that bacteria may travel faster in the opposite direction. Also, SCC increased as lesion scores increased (more severe lesions). Teat shape, length, diameter, pigmentation, and orientation did not have significant effects on SCC.

University of Wisconsin. Subclinical mastitis is an expensive problem. One major question is whether to treat lactating cows that have high somatic cell counts (which indicate subclinical

mastitis). Thirty-six quarters showing a positive reaction on the California mastitis Test (CMT) and somatic cell counts over 400,000 were treated three times at 12-hour intervals. No significant decline in SCC occurred, compared to control quarters. Bacteriological cure rates were low, only 23 percent. Cost per treated animal was $38, including treatment and discarded milk; and no increase occurred in milk yield. On the basis of results obtained, treating subclinical mastitis based on SCC during the lactation period is not recommended.

Cornell University. Information was collected from 1,374 Holstein cows in 31 herds to study factors affecting metabolic disorder. Milk fever increased the incidence of difficulty at calving by a factor of 7.2, ketosis by 23.6, and retained placenta by 4; and clinical mastitis by 5.4. Retained placenta, displaced abomasum, and milk fever increased the risk of ketosis by factors of 16.4, 53.4, and 23.6, respectively. Increasing energy prior to calving decreased displaced abomasum and calving problems, while higher protein reduced ketosis and retained placenta. Higher intakes of energy and protein in the last three weeks of the dry period may reduce the incidence of metabolic disorders.

Kansas State University. With conventional calf starters, calves may not get enough vitamin E for maximum performance. Supplementing the diet of calves with 1,400 or 2,800 milligrams of alpha tocopherol (vitamin E) resulted in a trend toward greater starter consumption and weight gain with high blood levels of vitamin E. Both injected and oral administration were beneficial.

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

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WHEAT AS A FORAGE ALTERNATIVE

With the announced government feed grain program to reduce wheat acreages harvested as grain, livestock producers should look at wheat forage alternatives. Winter wheat harvested in the boot stage results in a high quality forage. Quality changes rapidly with maturity, however, as indicated in Table 1.

Table 1. Nutrient values of winter wheat

Stage of maturity	Dry matter, %	Crude protein, %	Net energy, Mcal/lb	Acid detergent fiber, %	Calcium, %	Phosphorus %
Boot	15-23	20	0.76	32	0.24	0.35
Early head ..	20-30	15	0.68	37	0.19	0.34
Late head ...	30-37	11	0.46	43	0.10	0.28

Match the maturity of winter wheat harvested with the nutrient needs of your dairy cattle. For example, milk cows need wheat harvested in the boot stage, while dry cows can use the late head stage. Also note that the maturity stage at harvest affects the yield potential; delaying harvest increases quantity.

Because the moisture level in winter wheat can be high, wilting the forage down to the optimal levels of dry matter will depend on your silage storage unit. Recommended levels are 30 to 40 percent dry matter (D.M.) for bunker silos and plastic bags, 40 to 50 percent D.M. in conventional tower silos, and 50 to 60 percent D.M. in oxygen-limiting structures. Wheat forage must be tested because it varies greatly in quality, dry matter, and mineral content. Balance the rations according to results of wheat forage tests and the level of production or gain desired.

One method to determine the economic value of wheat silage is to use Morrison feed constants based on current feed energy (shelled corn) and protein (soybean meal) values.

- Energy value: .163 (energy constant) x $80 (value of one ton of shelled corn) = $13.04
- Protein value: .017 (protein constant) x $160 (value of one ton of soybean meal) = $2.72
- Value of one ton wheat silage in the early head stage containing 26 percent dry matter: $13.04 + 2.72 = $15.76.

For example, an acre of wheat forage in the early head stage could yield an estimated 1.5 tons of dry matter per acre, which would be 1.9 tons of baled hay (80 percent D.M.), 3 tons of wilted silage (50 percent D.M.), or 6 tons of direct cut silage (25 percent D.M.). If the direct cut is worth $15.75 per ton times 6 tons per acre minus the harvest cost of $30 to $40 per acre (to cut, condition, windrow, chop, and put in the silo), a livestock buyer could pay $50 to $60 per acre.

Another way to estimate a fair market price is based on current hay prices for comparable forage quality. In the example, one ton of baled wheat hay (comparable to a 15 percent protein grass type hay) may be worth $50 per ton (or $95 per acre) minus harvesting costs of $20 per ton (or $38 per acre), which equals $57 per acre.

Wheat forage is difficult to dry because of its high moisture content and the variable drying conditions in spring. Adjust your prices to reflect current prices for shelled corn and soybean meal, forage quality and stage of maturity, the levels of dry matter, and costs of harvest, transportation, and equipment wear. Check with your local ASCS office to determine the date when the wheat must be removed or destroyed. (M.F. Hutjens, Extension dairyman, and Dave Fischer, Clinton County adviser.)

STATUS OF COPRODUCT FEEDS

Dairy producers must continue to be aware of price changes and availability of coproduct (by-product) feeds.

Whole cottonseed has increased by $50 per ton, to more than $200 per ton. Short supplies and long hauling distances have caused the increase, with the current sources in Mississippi instead of Missouri. The break-even price for whole cottonseed is $120 per ton. If increases in milk fat tests occur, the break-even price would be high.

Dried distillers' grain continues at a good price, $120 per ton--with break-even prices at $126 per ton. The extra fat and bypass (nondegraded) protein are pluses for this feed; but avoid the product if it is dark in color, which may indicate heat damage.

Wet and dried brewers' grains are good buys if the dairy producer is close to the wet source. The dried product is difficult to obtain, but the price is right at $60 per ton; the break-even price is $112 per ton.

Wet corn gluten feed and dried corn gluten feed are at break-even prices; hominy, although not readily available, is also at break-even prices.

Beet pulp is available at $130 per ton, plus the cost of trucking from Minnesota. This is a better price than previously available, but the break-even price is $91 per ton.

New coproduct feeds that may be attractive in terms of price are sunflower meal (28 percent protein), rice bran, and rice mill feed--depending on your location and ration needs.

Feed prices represent 40 to 50 percent of the cost to produce milk. Be a sharp shopper. (M.F. Hutjens, Extension dairyman.)

RUBBER TIRES AS A SURFACE FOR FREE-STALL FLOORS

Washington State researchers have used old rubber tires to replace and improve flooring surfaces of free stalls. Several Illinois dairy farmers have also successfully tried this approach.

Guidelines include the following:

- Tires that are 14 inches in diameter were the best size to use.
- Drill four 2-inch holes in the lower lip or edge of the tire to allow moisture to drain.
- Place the tires side by side, starting at the rear of the free stall.
- Fill the tires with clay or sand, stamping it tightly inside the tires.
- Lime can be used for the top 2 inches of fill.
- Add bedding to the floor surface of the stall.

The rubber tires provide a flexible surface and avoid holes and digging out by the cattle. Cows prefer the stalls with implanted tires to traditional stalls. While the cost to install the tires is minimal, the labor input is high if the tires are correctly installed. (M.F. Hutjens, Extension dairyman.)

WHOLE HERD BUY-OUT PROGRAM

Interest in the whole herd buy-out program has been high in Illinois, with more than 150 farms establishing marketing histories in Stephenson County and 100 in Clinton County.

At the Tri-State Dairy Day, March 5 in Cuba City, Wisconsin, Dr. Bob Cropp, University of Wisconsin, Platteville, presented additional information about the buy-out program. The overall goal of the program is to reduce annual milk production by 12 billion pounds over an 18-month period. The 12-billion pound level was selected by subtracting domestic consumption (131 billion pounds) and government purchases (5 billion pounds) from the anticipated milk production for 1986 (148 billion pounds).

The buy-out program is intended to remove 920,000 cows from production; this figure represents between 15 and 18 thousand herds, about 9 percent of the herds in the United States. If bids are favorable, 2 to 3 percent of the herds in Illinois may be retired. One guideline for calculating a bid could be $12 per hundred pounds (cwt), based on producer contributions of $800 million and government contributions of $500 million. Bids of more than $20 per cwt may not be accepted.

Gramm-Rudman is also having an effect on the dairy bill, cutting $85 million in price supports and making two alternative routes possible: to increase producer assessment by 12 cents per cwt to 52 cents per cwt or to drop the price of purchased butter by 6 cents, cheese by 5 1/4 cents, and nonfat dried milk by 3 1/2 cents per pound.

One bright point in the dairy area is consumer consumption, which was up 3 1/2 percent in 1985. (M.F. Hutjens, Extension dairyman.)

THE AVERAGE ILLINOIS DHI HERD

A summary of 1,336 herds on the DHI test is summarized below. Compare your values to identify strengths and weaknesses. (M.F. Hutjens, Extension dairyman.)

Milk cows, number	59
Replacement heifers, number	57
Average age of all cows	4 years, 2 months
Average age of first-lactation cows	2 years, 4 months
Sires identified, percent	65
Dams identified, percent	80
Calving interval (pregnant cows)	402 days
Average days open	123 days
Average days to first breeding	89 days
Average services per conception	1.8
Average days dry	65
Average milk yield	15,574 lb
Projected 305, 2X, ME milk	16,720 lb
Difference from herdmates	+763 lb milk
Feed costs per cwt milk	$4.77
Return over feed costs	$2.71
Summit milk, first-lactation cows	54.7 lb
Summit milk, older cows	71.6 lb

FEEDING HEAT-TREATED SOYBEANS

Wisconsin researchers fed cows either a control diet with 20 percent soybean meal or a diet with 25 percent heat-treated whole soybeans (WSB). Heat treatment consisted of heating the beans to 182°C and passing them between rollers, which caused the beans to pop or explode before cooling. The WSB-fed cows peaked later (5 versus 3 weeks) and at a higher level (87.5 versus 86.7 pounds) of milk yield. WSB cows produced 4.4 pounds more milk by week 15 after calving, or an average of 1.76 pounds more milk per day for the 15-week period. Cows that were fed WSB consumed more energy, had higher plasma free fatty acid and triglyceride levels, and a lower rumen acetate-to-propionate ratio (3.36 versus 3.61). Fat test was slightly higher with WSB, with no effect on milk protein. If the price of WSB is favorable, cows in early lactation can be fed WSB. (M.F. Hutjens, Extension dairyman.)

AVAILABLE PUBLICATIONS

The following publications are available from the Dairy Extension Office, 315 Animal Sciences Laboratory, 1207 West Gregory Drive, Urbana, Illinois 61801.

1986 Illinois Dairy Report. This 44-page booklet contains three in-depth papers presented at the area dairy days, plus Illinois dairy research results reported in 1985. The cost is $2 per copy.

Managing the Financial Future of Your Dairy Farm. This seven-unit correspondence course is available for $5. The units included are

1. Determining Your Goals and Values
2. Gathering the Numbers You Need
3. Analyzing Your Numbers
4. Using Your Numbers in Decision Making
5. Evaluating Your Production Management Alternatives
6. Developing Your Long-Range Plan
7. Implementing Your Annual Plan

Corn Gluten Feed, The Future of Feeding. This 13-page booklet was written by the Illinois Corn Growers Association and the Illinois Corn Marketing Board, with University of Illinois specialists. The booklet discusses major livestock feeding strategies and feed composition. The booklet is free of charge.

USDA-DHIA ELITE COW INDEXES

A list of elite cows has been released by USDA. To be eligible, cows must be registered; have at least three modified contemporaries; have calved on or after October 1, 1983; currently alive based on DHIA codes; and have a record of at least 100 days in length if only one record was available. Minimum cow-index dollars (CI$) and number of elite cows by breed are listed below.

Breed	Minimum CI$	Elite cows, number
Ayshire	65	310
Brown Swiss	79	469
Guernsey	73	692
Holstein	108	7,611
Jersey	81	948
Milking Shorthorn	93	89

The CI$ was computed using a price of $11.70 per hundredweight (cwt) with 3.5 percent fat and a fat differential of 16.4 cents. This was the average U.S. milk price for 1985 minus average hauling, CCC, and promotion assessments. (M.F. Hutjens, Extension dairyman.)

ROUTES FOR ADDING SELENIUM

Researchers at Purdue University conducted a selenium supplementation study to evaluate oral additions (1 versus 2 milligrams per head per day) and intramuscular injections (50 milligrams at 40 and 20 days prepartum or at 60, 40, and 20 days prepartum).

Blood, hair, colostrum, and calf levels of selenium were measured. Oral supplements (2 mg per day) and both injection treatments increased serum selenium in cows, but only injected selenium increased calf serum levels. Hair levels of selenium were raised by both methods. Selenium level in colostrum was not raised by either method. The overall occurrence of retained placenta was 13.7 percent, scattered across treatments, with only the group of cows injected twice intramuscularly showing no incidence. Pregnant dairy cattle responded to selenium supplementations given either orally or by injection. Because blood serum levels of selenium appear to differ according to the amounts administered, greater levels may be necessary before milk levels are increased. (M.F. Hutjens, Extension dairyman.)

M.F. Hutjens, G.W. Harpestad Extension Dairymen

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 15, Number 2 *April 1986*

ILLINOIS INVOLVEMENT IN THE NATIONAL MILK REDUCTION PROGRAM

The results are in: 307 Illinois dairy herds have been accepted in the government's whole herd buy-out program. The average size for herds accepted in the program was 44 head, which is less than the 65-head average for all herds in Illinois. The bids represented 13,723 milk cows, 5,972 heifers, and 4,007 calves. The average of the bids accepted was $14.54 per hundredweight, with a range of $5.00 to $274.99. In all, 723 Illinois bids were submitted. Bids accepted in period 1 (beginning April 1, 1986) included 191 herds, with 49 bids in period 2 (September 1, 1986) and 67 bids in period 3 (March 1, 1987). Participation in Illinois is summarized by county, as follows:

County	Herds	Tested herds on DHI
Clinton	49	8
Jo Davies	31	9
Carroll	17	None
Stephenson	16	1
Effingham	16	2
Whiteside	16	3
McHenry	14	4
Iroquois	12	3
St. Clair	9	2
Ogle	9	4
Madison	8	None
Will	7	None
5 counties with 5	25	...
19 counties with 2 to 4	55	...
23 counties with 1	23	...
Total	307	

In 23 counties no bids were submitted; in 19 counties, no bids were accepted.

Participation in the dairy termination program on a national basis is summarized in Table 1.

Table 1. Participation in Whole Herd Buy-Out Program, by State

	Percent of U.S. production, 1985	Herds in buyout	Cows in buyout	Share of reduction, percent
Wisconsin	17.5	1,681	62,633	6.6
California	11.6	325	114,947	15.0
New York	8.2	542	34,858	3.4
Minnesota	7.6	2,150	79,597	7.4
Pennsylvania	7.0	418	20,614	2.2
Michigan	3.9	846	46,146	5.1
Ohio	3.4	194	14,547	2.0
Iowa	2.8	803	30,275	2.8
Texas	2.8	376	54,986	5.4
Washington	2.6	258	34,094	4.5
Illinois	2.0	307	13,723	1.3
Alabama	0.4	91	11,667	1.0
Arkansas	0.6	221	16,080	1.3
Georgia	0.9	179	24,419	2.1
Indiana	1.7	282	13,859	1.3
Missouri	1.1	645	36,974	3.6
Total, United States ...		13,988	951,619	

The total cost of the program will be $1.8 billion, 38 percent of which will be funded by an assessment of 52 cents per hundredweight of milk produced in 1986. This charge will drop to 25 cents per hundredweight for the first 9 months of 1987 but can be modified by Gramm-Rudman budget shifts.

The targeted reduction in milk production (more than 12 billion pounds) has been accepted by the USDA. The success of the program will depend upon changes in milk production by the remaining dairy farms. The 1986 assessments will cost dairy producers $50 to $60 per cow. Some managers must produce more milk to cover this added expense. (M.F. Hutjens and G.W. Harpestad, Extension dairymen)

WHY COWS LEAVE HOME

Cows are culled or removed from the dairy operation for several reasons. The following summary from the Ames, Iowa, DHI center shows why 127,999 cows were culled in nine states, including Illinois.

Reason culled	Percent culled	Difference from herdmates, lb milk
Injury	27.5	-1,210
Ketosis	0.7	-1,127
Low production	22.4	-2,472
Mastitis	9.6	-922
Reproduction	14.1	-194
Death	3.9	-237
Sold for dairy	8.0	-421
All others	13.8	-889

Difference from herdmates reflects the expected level of milk production as compared to the herdmates (cows of similar age and time of calving), independent of the herd average. A cow with a difference of -1,000 pounds of milk would produce 1,000 fewer pounds of milk than its herdmates.

DHI supervisors code the reason why the cow was removed from the herd, as reported by the dairy manager. The low-production group was also summarized by lactation number as follows:

Lactation	Percent	Difference from herdmates, lb milk
First	41.9	- 2,868
Second	23.5	- 2,326
Third	14.3	- 2,000
Fourth and later	20.2	- 2,472

Several interesting points can be drawn from the summary. Cows that were culled for reproductive problems represented the group highest in milk production. As expected, cows that were removed for low milk production were the lowest in milk yield as compared to herdmates. Surprisingly, cows that were sold for dairy purposes were below herdmates in milk yield, which indicates that buyers bought below-average cows and that one should check production records carefully when purchasing dairy cows to ensure that a genetically superior cow is purchased. (M.F. Hutjens, Extension dairyman)

COMPETING IN U.S. DAIRY BUSINESS

The 1985 dairy production figures from the USDA indicate that the average dairy cow in the United States produced 13,031 pounds of milk, up 526 pounds as compared to 1984; 11 million cows produced 143.7 billion pounds of milk; and the number of dairy farms in the United States declined by 11,120 since 1984.

Illinois dairy cows average 12,026 pounds of milk, up 283 pounds. The number of cows increased 10 percent, with 234 thousand cows on 3,600 dairy farms in Illinois, based on the number of milk-marketing permits.

If the Illinios dairy industry is going to compete in the future, milk yield per cow must catch up with and surpass the national average. One key to survival will be a reduction in the costs to produce 100 pounds of milk. Illinois DHI data clearly point out that higher milk yields will lower the cost of milk production because costs are spread over more units of milk produced. Break-even milk yield in 1985 was about 15,000 pounds per cow (Holstein breed). (M.F. Hutjens, Extension dairyman)

4-H UPDATE

Illinois enrollment in the 4-H dairy project was 1,465 in 1985 (601 female and 864 male youth). Nationally, 77,937 youth are enrolled in the 4-H dairy project.

A new dairy activity will be pilot-tested June 17, when counties may each enter a team in the first 4-H Dairy Bowl Competition. Teams of four 4-H members will compete in written and oral competition, answering questions on all phases of dairying and dairy management. The top team in Illinios will be eligible to compete at the national contest in Louisville, Kentucky, in November. Contact the Dairy Extension Office for rules and details. (M.F. Hutjens, Extension dairyman)

RESEARCH UPDDATE

Several research reports that may be of interest appeared in the February issue of the *Journal of Dairy Sciences*. (M.F. Hutjens, Extension dairyman)

South Dakota State University

An extruded blend of soybean meal (50 percent), sunflower seeds (45 percent), and a premix (5 percent) did not increase milk yields but decreased milk solids, as compared with cows fed soybean meal. Rumen fermentation patterns favored cows that were fed the blended feed. Heat-treating the blended proteins lowered rumen degradation. This supplement would show more advantages for dairy cows in early lactation; feed in an amount to avoid high levels of fat.

University of Illinois

Rumen-fistulated steers were fed one of two grain mixtures as 60 percent of their ration. The control diet was shelled corn and soybean meal; the experimental mix consisted of 74 percent dried whey. Increasing the frequency of feeding from 2 to 8 times per day increased acetate production and decreased lactate production. Protozoa numbers were higher when whey was fed because more soluble carbohydrates were present and rumen pH was higher. The protozoa were kept in a feeding state throughout the day, which was beneficial in two ways. First, less fluctuation in rumen pH should occur because the protozoa remove soluble sugar. Secondly, the protozoa are more likely to pass from the rumen to the lower tract, resulting in great microbial protein for the cow. Reduction in daily rumen variation with a schedule of frequent feeding suggests a more stable rumen environment and avoids off-feed problems, rumen acidosis, and low milk-fat tests.

West Virginia University

Continuous culture fermentations were conducted to determine the effect of pH on fermentation. Digestibility of organic matter, fiber, and nitrogen was depressed at pH 5.8 and was increased markedly at pH 6.2. Slight improvements were seen from pH 6.2 to 7. Production of total volatile fatty acids (VFA) was highest at pH 6.2 and 6.6. The percentage of the microbial population associated with fiber decreased when pH was reduced below 6.2. Low pH decreased microbial attachment to feed particles, which explains decreased fiber digestion. A decrease in protein digestion at pH 5.8 is the reason that low amounts of branch-chain fatty acids and ammonia were present.

Kansas State University

Holstein calves were fed milk or milk replacers containing casein, soy protein concentrate, soy flour, or fish protein concentrate. Daily weight gains were highest with milk (0.92 lb), followed by casein (0.44 lb), soy flour (0.29 lb), soy concentrate (0.20 lb), and fish (-0.15 lb). Fecal scores (an index of scouring) followed a similar pattern. Morphological changes of the intestinal linings

revealed damage to the villi (small fingerlike projections) in the calves that were not fed milk. This damage would explain why poor growth and scouring occurred. Diets were changed to milk in an attempt to reverse the intestinal damage. After two weeks, the villi returned to normal size and shape.

Texas A and M University

Experiments were conducted to determine the effectiveness of chilled water in reducing heat stress. Four temperatures were used: 10°C, 16°C, 22°C, and a control at 28°C. Chilled water was only 32 percent effective in reducing body temperature and was effective for only 2.2 hours. Offering chilled water at milking time may be an incentive for cows to enter the milking parlor. The cost per cow per day to chill the water varied from 5 cents at 22°C to 12 cents at 10°C.

Virginia Polytechnic Institute

Somatic cell counts on the initial test day of first-lactation cows were used to determine if cows with low counts were at more risk to subsequent mastitis infection. Cows were categorized by somatic cell counts into 3 groups: those with counts less than 100 thousand, 100 to 400 thousand, and more than 400 hundred thousand. The results of this study indicate that cows with low somatic cell counts are *not* at higher risk. Instead, they are at lower risk--resulting in more milk, fewer major pathogens, and fewer minor pathogens.

ILLINOIS HAY SALES

Following is a summary of a series of hay sales that were held in Northern Illinois.

Date	Location	Price per ton	Crude protein (CP)	Acid detergent fiber (ADF)	Neutral detergent fiber (NDF)	Relative feed value (RFV)
			----------*percent*----------			*(units)*
December 16, 1985	Freeport	$71.88	18.9	35.4	47.7	123
January 9, 1986	Elizabeth	$64.87	18.6	34.7	47.3	125
February 13, 1986	Mt. Carroll	$69.86	18.1	34.1	49.1	123
March 8, 1986	Lyndon	$54.61	16.9	34.8	46.9	125
April 2, 1986	Freeport	$45.37	17.2	35.5	47.7	123

Hay quality was above average, with protein values higher than 16 percent and ADF less than 36 percent. As an early spring followed a mild winter, hay prices dropped even though quality was high. At all sales, forage of higher quality, as determined by results of forage tests, commanded higher prices. Hay buyers were willing to pay for quality, but supply-and-demand factors came into play. (M.F. Hutjens, Extension dairyman)

WHY ARE CALVING INTERVALS SO LONG?

Most dairy producers and researchers agree that cows should calve at a regular interval of 12 to 13 months to maximize milk production over a cow's lifetime. Economists estimate that allowing the calving interval to go beyond 13 months

costs the dairy manager at least $2 per cow per day because the duration of pregnancy is fixed (275 to 290 days). Prolonged calving intervals are caused by an excessive number of days open. Days open cannot exceed 118 if a calving interval less than 13 months is to be maintained; yet the national average for DHI herds is 136 days open, 18 days more than the target.

The reproductive system of the cow recovers from pregnancy within 40 days after calving. The factors that contribute to long open periods can be divided into two categories: factors that result in a failure to inseminate cows when they are in heat and factors that result in the failure of a pregnancy to occur when cows are inseminated (Table 2).

Table 2. Factors Contributing to Prolonged Days Open

Failure to inseminate		Failure to produce pregnancy	
Missed heat[a]	40%	Inseminated at wrong time[a]	5%
Silent heat[b]	5%	Poor insemination technique[a]	5%
		Tract abnormalities[b]	2%
		Fertilization failure[b]	5%
		Embryo mortality[b]	28%
		Fetal mortality[b]	3%

[a]Management problem.
[b]Biological problems.

Improved reproductive management will have the greatest impact on shortening the days open. Embryo mortality is the biggest biological problem. Through the combined efforts of dairy managers and researchers, progress can be made toward maintaining a proper calving interval in our dairy herds. (William Silva, University of Kentucky animal scientist)

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 15, No. 3 *October 1986*

MAMMARY DEVELOPMENT IN HEIFERS

Recent research in the United States and Denmark indicates that energy intake is critical in young replacement heifers. From birth to 3 months of age, little mammary gland development occurs. A critical time for development, however, is from 3 months of age through puberty (2 to 3 months after the first estrus). If heifers gain more than 750 grams per day (1.65 lb), development of the mammary glands and formation of secreting cells can be reduced. Overfeeding appears to depress growth hormone production in the young heifer. When the heifer has passed puberty, excess energy intake does not have a negative influence on mammary development (excessive fatty deposit and connective tissue development and lowered secretory cell formation). After breeding, additional energy intake can increase milk yield in the first lactation.

Preliminary research with injected bovine somatotropin (growth hormone) into young heifers (from 8 to 12 months of age) showed stimulation of development, which could increase milk yield in subsequent lactations. More research will be needed to confirm this potential use of growth hormone.

Dairy farmers must manage heifer growth carefully. Slow growth (less than 1.3 pounds per day) will delay puberty and breeding and will cost $2 per day when heifers exceed 24 months of age. Young heifers gaining more than 1.65 pounds risk suppressed mammary gland development. Heifer growth should be monitored and evaluated. (M.F. Hutjens, Extension dairy specialist)

COSTS TO PRODUCE MILK

Although Illinois dairy producers continued to show "red ink" in 1985, margins improved when compared to 1984, according to figures summarized by University of Illinois agricultural economists in cooperation with the Illinois Farm Business Farm Management (FBFM) Association. Individual records tabulated were from farmers enrolled in the FBFM record-keeping and business analysis program.

A detailed breakdown by herd size of 1985 milk production costs and returns for dairy farms is shown in Table 1. Farms included had no other livestock, with all costs accounted for either in crops or in the dairy enterprise. Total costs for the dairy enterprise were reduced by income from sales of dairy animals or from an inventory increase in pounds of beef produced during the year. The value of the added pounds was figured at the average price received for all weights of dairy animals sold in the past 5 years. The residual costs--88 percent of the total enterprise costs--were the net cost of producing milk. The feed cost includes on-the-farm grains evaluated at average Illinois market prices for the year, with

Table 1. Costs and Returns for Illinois Dairy Enterprises, by Herd Size, 1985

	40 to 80 cows per herd	More than 80 cows per herd	All units
Number of farms	138	46	184
Average tillable acres per farm	284	428	320
Average number of cows per farm	58.2	103.1	69.4
Average milk per cow, pounds	14,997	15,313	15,076
Average beef produced per cow, pounds	601	579	596
Costs per cow, milk plus beef	$ 2,297	$ 2,301	$ 2,298
Average returns from beef	275	281	277
Net costs for milk per cow	2,022	2,020	2,022
Return from milk per cow	1,842[a]	1,880[a]	1,852[a]
Return above all cost	$ - 180	$ - 140	$ - 170
Cash costs per 100 pounds of milk produced,			
Feed	$ 5.95	$ 5.91	$ 5.94
Operating expenses,			
Maintenance and power	$ 1.32[b]	$ 1.34[b]	$ 1.33[b]
Livestock expense	.92	1.03	.95
Insurance, taxes, and overhead	.31	.26	.30
Total operating expenses	$ 2.55	$ 2.63	$ 2.58
Other costs per 100 pounds of milk produced,			
Depreciation	$ 1.31[c]	$ 1.25[c]	$ 1.30[c]
Labor	1.97	1.63	1.89
Interest charge on all capital	1.75	1.70	1.74
Total other costs	$ 5.03	$ 4.58	$ 4.93
Total nonfeed costs per 100 pounds of milk produced	$ 7.58	$ 7.21	$ 7.51
Total all costs per 100 pounds of milk produced	$ 13.53	$ 13.12	$ 13.45
Net price received per 100 pounds of milk produced	$ 12.28	$ 12.28	$ 12.28
Return above all costs per 100 pounds of milk produced	$ -1.25	$ - .84	$ -1.17

[a]ACSC payments for government dairy reduction program were not included.
[b]Includes utilities, machinery, equipment and building repairs, machines hired, and fuel.
[c]Includes machinery, equipment, and building depreciation.

corn at $2.54 per bushel and oats at $1.65. Commercial feeds were listed at actual cost, hay and silage at farm values, and pasture at 40 cents per animal per pasture day.

Herds with more than 80 cows not only produced more milk per cow but did so more cheaply. Compared with herds of 40 to 80 animals, larger herds produced an additional 316 pounds of milk per cow. Total costs for each 100 pounds of milk

produced were 41 cents lower for the larger herds. Labor costs, which were 34 cents less per 100 pounds produced, accounted for most of the difference. For each 100 pounds of milk produced, the large herds also averaged 4 cents lower feed costs and 5 cents lower interest charges. The trend in total costs and returns per cow for all herds is given from 1982 to 1985 (Table 2). When cash and noncash costs are figured, the profit margin (return above all cost) increased--from $-320 in 1984 to $-170 per cow in 1985.

Table 2. Costs and Returns per Cow for Illinois Dairy Enterprises, 1982 to 1985

	1982	1983	1984	1985
Number of farms	182	211	177	184
Number of cows	72	73	70	69
Net cost for milk, per cow	$ 1,918	$ 2,096	$ 2,130	$ 2,022
Return from milk, per cow	1,803	1,831	1,810[a]	1,852
Return above all costs, per cow	$ -115	$ -265	$ -320	$ -170
Price received per 100 pounds of milk	$ 13.01	$ 12.63	$ 12.50	$ 12.28
Price received per 100 pounds of beef	$ 47.30	$ 45.64	$ 43.92	$ 44.23
Milk produced per cow, pounds	13,860	14,496	14,483	15,076

[a]ASCS payments for government dairy reduction program were not included.

While beef prices have stabilized, milk prices continue to decline. Costs, which had been increasing in recent years, decreased in 1985. Lower feed costs and interest charges were the main factors in this cost decrease. Higher milk production per cow has held returns from milk per cow at stable levels even though the price received for milk has been decreasing. Continued decreases in feed costs can be expected in 1986 and 1987, as feed supplies are at record high levels. In 1985, feed costs made up 44 percent of the total cost to produce milk. With expected declines in feed costs, this share could drop to 40 percent in 1986.

The production cost difference between large and small herds--41 cents per 100 pounds of milk producted for 1985--is expected to increase or continue about the same. Increased milk production per cow--through better management--combined with the ability to spread labor and other fixed costs over more units of production, is making the larger herds more competitive. But, like most other livestock farmers, the dairy farmers who have large amounts of unpaid family labor and who use little borrowed money can best withstand long periods of negative profit margins. (D.H. Lattz, Extension farm management specialist)

MASTITIS IMPROVEMENTS

The July summary of 578 herds enrolled in the Illinois DHI somatic cell count program continues to show marked improvement. The average herd somatic cell count was 422,000. Only 16 herds, or 2.77 percent, were over the one-million maximum action level. Compared to eight other midwest states, the percent of Illinois cows under 300,000 was 7 percent higher (69 percent of the herds). Low somatic cell counts indicate less mastitis, high milk yield potential, and more income. Cell count averages were 386,000 for cows fresh fewer than 50 days; 396,000 for

cows fresh to 200 days; and 434,000 for cows fresh more than 200 days. All Illinois values were below the eight-state average values. Dairy managers must continue to lower somatic cell counts to reduce mastitis risk and increase profitability. (M.F. Hutjens, Extension dairy specialist)

FUTURE DAIRY PLANS

A recent survey of 495 Illinois dairy farmers conducted by an Illinois milk-marketing cooperative provided an interesting look at future production plans.

	Number of Farms
Planning to decrease production less than 10 percent	51
Planning to decrease production 11 to 20 percent	24
Planning to decrease production more than 21 percent	5
Total planning to decrease	80 (16.2 percent)
Planning to stay the same	129 (26.1 percent)
Planning to increase production less than 5 percent	34
Planning to increase production 6 to 10 percent	61
Planning to increase production 11 to 20 percent	76
Planning to increase production 21 to 30 percent	50
Planning to increase production 31 to 40 percent	25
Planning to increase production 41 to 50 percent	11
Planning to increase production more than 50 percent	29
Total planning to expand	286 (57.5 percent)

Since September 1985, 44 new producers joined the co-op, 31 quit, and 40 will quit because of the government buyout program. The co-op will have at least as much milk this fall and winter as last year. (*Prairie Farms News*)

NEW DEWORMER AVAILABLE

Morentel tartrate is a new anthelmintic commercially available for dairy cattle. The product is clearly for all ages of dairy cattle, including lactating dairy cows (no milk withdrawal). A single treatment provides a broad spectrum of protection against internal parasites. The recommended dose is 4.4 mg of morentel per pound of body weight. A 14-day pre-slaughter withdrawal time must be observed with morentel tartrate.

Thiabendazole and coumaphos are two other commercial products that can be used in dairy cattle. Coumaphos should be fed for 6 consecutive days with no milk withholding. Thiabendazole-treated cows must have milk withheld for 96 hours or 8 milkings after the last treatment. Several other dewormers used with livestock are not approved for use in female dairy cattle of breeding ages. Dairy farmers must follow labeled directions and be aware of product restrictions and treatment schemes. (M.F. Hutjens, Extension dairy specialist)

DAIRY ADVERTISING

America's dairy farmers, through the National Dairy Board (NDB), will provide 71 percent of the dairy product advertising in the national media during the 1986-87 advertising year.

The board has developed a tentative advertising budget of $64 million for the new year, the largest portion of which is allocated to cheese, with dairy calcium advertising close behind.

Advertising expenditures to be funded by the NDB in the new advertising year include $20.5 million for cheese, $16.5 million for dairy calcium, $8 million for adult fluid milk, $7 million for butter, $6 million for children's fluid milk, $5 million for ice cream, and $1 million to pretest national campaigns for milk ads aimed at a preteen audience and for a butter promotion.

The $64 million represents the lion's share of an estimated total national dairy advertising budget of more than $90 million, which includes participation from other promotion groups.

According to the terms of the statute under which the national board operates, 15 cents per hundredweight of milk marketed is deducted from farmers' milk checks for promotion and research. Five cents of that goes to the board, the other 10 cents to state and regional promotion programs. The funding from other promotion groups is part of the 10-cent deduction. (*National Dairy Board News*, August-September 1986 issue)

A.I. SIRES CONTINUE TO EXCEL

In the July USDA-DHIA Active Sire Summary, 545 bulls (all breeds) that are used for artificial insemination (A.I.) had a PDM of +781 lb of milk, -0.01 PD%, +28 lb of PDF, and +$92 PD$. Non-A.I. bulls (8547 bulls) averaged -332 lb of PDM, +0.01 PD%, -11 lb of PDF, and -$38 PD$. Economic values were based on a milk price of $11.70 per hundredweight with 3.5 percent fat, a 16.4¢ fat diffferential (0.1 point), and 11.4¢ protein differential (0.1 point). PD dollars reflect the economic value of the genetic-transmitting ability for production. Dairy managers must capitalize on the genetic and economic superiority of A.I. sires. (M.F. Hutjens, Extension dairy specialist)

References to commercial products or trade names are for educational purposes only. No discrimination is intended and no endorsement by the Cooperative Extension Service is implied for specific products.

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 15 Number 4 *December 1986*

ILLINOIS DAIRY DAYS

With profit margins remaining tight, dairy producers must have the know-how to run the most efficient operation possible to stay in business.

The 1987 Dairy Days, which have been set for 10 locations throughout the state in January, will give dairy producers the opportunity to benefit by valuable management advice.

The theme for the meetings is "Making the Difference in 1987." Each meeting will feature advice from specialists on dairy feeding, reproduction and energy use. The meetings, which begin with registration at 10:50 a.m., are schedulated to end about 3 p.m. Topics and speakers for each of the meetings are as follows:

- Searching for Hidden Dollars--Gary Harpestad, University of Illinois Extension dairy specialist.

- Fine Tuning Dairy Rations--Mike Hutjens, University of Illinois Extension dairy specialist.

- Reproductive Management Goals--Stan Smith, University of Illinois area dairy specialist.

- Energy Use and Conservation for Dairy Farms--Tad Kerr, University of Illinois area agricultural engineer.

Dates and locations for the 1987 Dairy Days are:

Jan. 12--Kankakee, Redwood Inn
Jan. 13--Marengo, Cloven Hoof Restaurant
Jan. 14--Freeport, Masonic Temple
Jan. 14--Elizabeth, Community Building
Jan. 15--Sterling, Emerald Hill Country Club
Jan. 16--Pekin, Agricultural Center
Jan. 20--Quincy, Farm Bureau Building
Jan. 21--St. Libory, American Legion Hall
Jan. 22-Breese, American Legion Hall
Jan. 23--Teutopolis, Knights of Columbus Hall

A $3 registration fee--payable at the door--will cover the cost for each farm unit represented. Meal and facility expenses are partially supported by a grant from the Illinois Department of Energy and Natural Resources. (M.F. Hutjens, Extension dairyman)

FEEDING WEATHER-DAMAGED SOYBEANS

Northern Illinois soybean crops suffer from significant mold damage. Damage estimates range from 5 to 30 percent with price discounts as high as $1 per bushel. Some beans are refused at points of sale to the export markets.

One alternative for these damaged soybeans is to feed them to dairy cattle. Several management and feeding guidelines are listed below.

- Seven percent of the total ration dry matter can be fed as raw beans (3 to 4 pounds per day for high-producing cows). Heat-treated soybeans (extruded or roasted) can be fed at higher levels (5 to 6 pounds per day to high-producing cows).

- The mold damaged beans are nutritionally equal to normal beans (41 percent crude protein and 18 percent oil on a dry matter basis). Add only the amount of soybeans to balance protein needs.

- Preliminary myrotoxen analyses indicate no problems would be expected. If beans appear excessively damaged, the University of Illinois Veterinary Diagnosis Lab can test a quart sample (cost $25) for several myrotoxens. Call Dr. Karen Harlin (217) 333-1620 for shipping directions and details.

- If a dairy producer can purchase soybeans for less than $5 a bushel, the raw beans are considered to be a good buy. Heat-treatment will increase costs $20 to $40 per ton, lower protein degradability in the rumen, improve protein utilization, and minimize rancidity in ground or cracked beans.

- Soybeans should be coarse ground, rolled, or crimped while maintaining feed flowability and minimizing an oily product that reduces palatability.

- Increase the level of forage, fiber, calcium, and magnesium in the diet to improve oil utilization by dairy cattle.

- Be sure soybeans were below 13 percent moisture before storage.

- Higher moisture levels could cause further spoilage and damage that could affect health and performance.

Feeding damaged soybeans to dairy cattle can be an economical alternative for dairy farmers and a market for soybean growers. (M.F. Hutjens, Extension dairyman)

BY-PRODUCTS FEED PROFILE

The following table can assist dairy managers in determining whether or not by-product feeds are economical feed choices. Break-even costs were based on Morrison feed constants with shelled corn valued at $60 per ton and soybean meal worth $200 per ton.

By-Product Feed	Break-Even	Cost
	----------$ per ton----	
Dried brewers' grain	115	70
Wet brewers' grain (30% DM)	34	26
Dried corn gluten feed	115	100
Wet corn gluten feed	52	50
Corn distillers' grain	112	110
Hominy feed	66	62
Whole cottonseed	99	160
Soybeans	170	142

Costs were obtained from dairy producers and distributors in November. Break-even price should be higher than the cost of the feed delivered to the farm to be a good buy. No economic credit was given for oil content, lower protein degradation in the rumen, or higher mineral levels. (M.F. Hutjens, Extension dairyman)

ALOTOXIN UPDATE

Dairy managers should monitor the status of corn as sprouted and field damaged corn or temporary storage could result in moldy damage. *Aspergillus flavis* is the storage mold of concern because it can produce aflotoxin. A quick test for the potential aflotoxin is a positive black light test. Samples that test positive should be analyzed to determine aflotoxin content.

Three potential problems with aflotoxin-contaminated corn can occur. Approximately one percent of aflotoxin is excreted in milk. Milk must be below .5 ppb (parts per billion). Thus, corn over 100 ppb can lead to unmarketable milk since the milk cow's diet consists of half forage (which dilutes the damaged corn). Secondly, high levels (over 600 ppb) can cause reduced dry matter intake, growth, and milk yield. Third, the liver is affected, causing a reducation in nutrient use, and the natural defense mechanism and immune processes are affected.

Recommendations for using damaged corn include: testing to determine levels, diluting with wholesome feed, avoid feeding to lactating cows or calves and stressed or diseased cattle, watching for reduced feed intake, and limiting secondary mold formation in feed bunks.

1986 DAIRY JUDGING RESULTS

University of Illinois

Team members: Patty Quartier, Danville; Karilyn Stoll, Chestnut; Dana Serven, St. Augustine; Melvin Kuhn, Mendon; Steve Irwin, Beason; Rodney Delost, Canton; Jim Butler, Chebanse; Lynn Lenschow, Sycamore; Vic Lenkaitis, Granville.

Contest Results: Mid-South Fair, Memphis, TN, 3rd out of 13 teams; National Contest, Madison, WI, 12th out of 33 teams; All American Contest, Harrisburg, PA, 5th out of 20 teams; and Midwest Regional Contest, Waterloo, IA 12th out of 16 teams.

Coaches: Sid Spahr, Gene McCoy, and Mark Cameron

Illinois State University

Team Members: Bruce Lange, Centralia; Jack Lister, Ringwood; John Rice, Sheldon; Diane Timmerman, Galena; Arnold Adams, McLean; Ray Mohr, Normal.

Contest Results: Mid South Fair, Memphis, TN, 9th out of 13 teams; National Contest, Madison, WI, 17th out of 33 teams; All American Contest, Harrisburg, PA, 13th out of 20 teams; and Midwest Regional Contest, Waterloo, WI, 5th out of 16 teams

Coach: Clarence Moore

Illinois 4-H Teams

Team Members: Randy Anderson, Chatham; Dave Irwin, Lincoln; Dan Meyer, Manteno; Brian Olbrich, Harvard; Jeffrey DeWall, Shannon; Albert Lankaitis, Granville, Mark Olbrich, Harvard; and Randy Stoll, Chestnut.

Contest Results: Mid-South Fair, Memphis, TN, 1st out of 8 teams, and high individual (Rod Stoll); National Contest, Madison, WI, 3rd out of 36 teams and 2nd high individual (Randy Anderson).

Coaches: Mike Hutjens and Brian Sager

KEEPING UP WITH RESEARCH

Several research reports are available to provide valuable information for improving dairy management decisions. The source is identified for readers who wish to obtain more information. (M.F. Hutjens, Extension dairyman)

Rumen Degradation of Brewers Grain

Wisconsin researchers reported that dried brews grain was significantly high in non-degraded protein (58 percent) compared to wet brewers grain (27 percent) and soybean meal (17 percent). Drying the wet brewers grain at 50°C or 150°C improved the escape or by-pass level and was comparable in feed value. The amino acid profile delivered to and digested in the small intestine were similar for diets containing dried brewers grain and soybean meal. Increasing dietary protein above 13 percent with dried brewers grain did not increase total nitrogen supplement to the small intesting.

Conclusions. Dried brewers grain can improve milk production due to decreased rumen ammonia production. Since the protein in dried brewers grain is resistant to rumen breakdown, a degradable source of nitrogen with dried brewers grain may improve total protein available to high-producing cows.

Feed Delivery Systems

Agway workers (Syracuse, New York) used 40 cows to evaluate grain and forage fed separately (forages behind a Calan door and grain fed with an electronic feeder) compared with a total mixed ration (T.M.R.). Forage was ged free choice behind the Calan door. After 27 days, half of the cows on each treatment were abruptly switched to the other ration for 27 days.

Both groups had similar milk yields. Dry matter intake was lower for cows fed forage and grain separately due to reduced forage intake in the first 27 day period and lower grain intake in the second 27 day period. Milk production efficiency (pounds milk/pounds of dry matter) favored the forage and grain separate group. Abruptly changing cows from one feeding system to another did not affect milk yield, milk composition, or body weight change.

Conclusion. Both feeding systems performed well. System choice will depend on herd size, facilities to allow grouping, and level of management.

Hoof Growth and Wear

North Carolina researchers recorded hoof growth and wear on 223 Holstein cows in two herds during 20 months. Herd 1 was maintained on pasture or dirt lots while herd 2 was confined in a new freestall facility. In both facilities, rear hooves grew and wore faster than front hooves. Hooves of cows confined on new, abrasive concrete wore 35 percent more than those on dirt. Rate of hoof growth was also greater when animals were in confinement; but the rate of growth was not as fast as the increase in wear. During the first lactation, no increase in hoof length occurred in the herd in confinement when growth should have occurred. Hooves of confined cows in the second lactation decreased in length.

Conclusion. Cows on rough concrete need a dry period on dirt for hooves to recover length worn off while on concrete. Floor surface has an effect on foot growth and must be considered.

Using Artificial Insemination Effectively

Cornell workers conducted two studies involving reproductive practices in dairies using owner or professional inseminators. In study one, 234 herds were studied to obtain data on owner-inseminators. Improved timing of insemination during estrus and convenience were reasons dairy farmers gave for performing their own inseminations. Less than half of the herds were observed specifically for estrus at scheduled intervals. Cows were frequently inseminated more than once per estrus with 65 percent of the inseminations performed within two hours of milking.

The second study involved a random selection of professional inseminations to match similar owner-serviced herds in study one. The 1.70 services per conception achieved by professional technicians were only slightly better than the 1.74 achieved for direct service personnel.

Conclusion. Both methods of inseminating cows resulted in comparable success. Heat detection is critical irregardless of the individual breeding of the animals. The reason for more timely insemination by dairy managers was not practiced on farms.

Beta Carotene Update

Canadian researchers st the University of Guelph used 56 cows to determine if supplemental beta carotene (a precusor of vitamin A) improved reproductive performance. The supplemented diet contained 400 milligrams of added beta carotene and was fed from 10 days after calving until cows were confirmed pregnant. Control cows received 160,000 international units of vitamin A per day. Results are listed in the table below.

Measurement	Control	Supplemented
Days to 1st ovulation	19.5	22
Days to 1st service	73	77
Days open	82	97
Services per conception	1.9	1.6
Follicular cysts (%)	8	11
Luteal cysts (%)	21	7
Pyometra (%)	4	0
Endometritis (%)	13	7

Added beta carotene did not improve the fertility of the Holstein cows in the study.

Conclusions. Dairy cows receiving recommended levels of vitamin A did not respond to supplemental levels of beta carotene measured by improvement in reproductive performance. The results of this study are similar to Virginia results reported in 1984.

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Volume 16, Number 1 *February 1987*

FEEDING CALVES RAISED IN HUTCHES DURING COLD WEATHER

When the weather turns cold, young calves raised in outside hutches need extra energy to maintain body heat. Maintenance requirements increase one percent for each degree F drop below thermal neutrality (the point when energy is spent to keep warm). This point is near 30°F for young calves, because little body fat exists, and haircoats are short.

South Dakota research indicates calves should receive 1.5 pounds of solids fed in two or more liquid feedings per day during cold weather for optimal growth and health of calves housed in hutches. Normally, 1 pound of milk solids is fed (8 pounds of whole milk or 1 pound of milk replacer). Minnesota researchers suggest that three feedings should occur when the liquid diet is increased 25 percent above normal.

Several methods can be used to increase solids intake. (1) Feeding soured colostrum will provide extra protein and fat. Diluting 3 parts colostrum with 1 part warm water (instead of 2:1) will increase solids intake. (2) Shifting to a higher fat content milk replacer (20 percent versus 10 percent) will increase energy intake. (3) Increasing the amount of liquid (milk or milk replacer) will increase solids. (4) Feeding prestarter (a dry pelleted milk replacer) will increase dry matter intake. (5) Adding a commercial dry fat product (1/4 pound per day) to "spike" the liquid diet. (6) Encouraging calves to consume a high quality calf starter will provide more nutrients.

Raising calves in hutches is an ideal way to raise healthy calves. Making energy adjustments during cold weather stress will ensure success. (M.F. Hutjens, Extension Dairyman).

FOUR STATE DAIRY SEMINAR

"Dairy Nutrition: Feeding for Profit" is the theme of a new extension dairy program. Dairy specialists from four states will present the latest facts and figures on dairy nutrition. The Illinois meeting is scheduled for March 10 at Highland Community College Auditorium, Pearl City Road, Freeport. Programs will also be held at Madison, Wisconsin, Ames, Iowa, and St. Paul, Minnesota. Topics and speakers are listed below.

- Energy Needs for the Lactation Cycle--Dr. Mike Hutjens, University of Illinois.

- Fiber and Its Use in Ration Balancing--Dr. Lee Kilmer, Iowa State University.
- Metabolic Diseases--Nutritional Relationships and Control--Dr. Jim Linn, University of Minnesota.
- Nutritional Guidelines for Ration Formulation--Dr. Terry Howard, University of Wisconsin.

The program begins at 10:30 a.m. (registration at 10:00 a.m.). A registration fee of $15 includes lunch and conference proceedings. For details and registration, contact Bob Lahne, Stephenson County Extension Adviser, (815)235-4125. (M.F. Hutjens, Extension Dairyman).

ILLINOIS DAIRY PRACTICES AND PRODUCTION RELATIONSHIPS

During the winter of 1986, Illinois dairy farmers on DHI completed a survey of practices on their farms. Specialists from Nebraska summarized milk production associated with various programs. Part of the results are listed in Table 1. (M.F. Hutjens and G.W. Harpestad).

Table 1. The Relationship of Illinois Dairy Practices to Milk Yield and Number of Operations

Practices or Program	Number of Farms	Milk Yield (lb)
1. Housing Type		
Tie Stall	106	17034
Warm Freestall	30	16763
Stanchion	314	16101
Cold Freestall	317	15908
Loose Housing	78	15068
2. Use of Buffers		
Yes	394	16476
No	295	15547
3. Dry Cow Ration		
Yes	356	16465
No	333	15665
4. Heifers Separated from Milk Cows		
Yes	646	16147
No	72	15276

Table 1. Continued

Practices or Program	Number of Farms	Milk Yield (lb)
5. Type of Corn		
High Moisture Shelled Corn	184	16540
Dry Ear Corn	172	16056
High Moisture Ear Corn	52	15925
Dry Shelled Corn	339	15897
6. By-Product Feeds		
Whole Cottonseed	21	16871
Dried Brewers Grain	10	16653
Distillers Grain	50	16368
Corn Gluten Feed	76	16367
Soyhulls	20	15258
7. Protein Sources		
Soybeans	32	16747
Cottonseed Meal	10	16501
Commercial with Urea	49	16381
Commercial with No Urea	397	16163
Soybean Meal	300	15954
8. Silage Storage		
Oxygen-Limiting Structures	165	16262
Conventional Upright Silo	541	16092
Bags	39	16011
Stack on Ground	25	15624
Bunk	12	15398
Trench	12	15063

DAIRY FEEDING WORKSHOP

The Clinton County Extension Service is sponsoring a two-day indepth dairy feeding workshop on February 24 and 25, 1987 at Breese, Illinois. Ed Jaster, Dave Fischer, and Mike Hutjens will team teach the fast-moving program covering economics, protein, energy, fiber, micronutrients, forages, grain systems, forage additives, and grain additives. The workshop will run from 10:00 a.m. to 3:30 p.m. each day. Cost will be $25 per person, with a pre-enrollment limit of 35 dairy farmers. Contact Dave Fischer (618-526-4551) to make a reservation and obtain program details.

KEEPING UP WITH RESEARCH

A symposium on protein and fiber digestion was published in a recent issue of the *Journal of Dairy Science*. Summaries of three papers are discussed below. For more details, contact our office or the author. (M.F. Hutjens, Extension Dairyman).

Protein Supply (L.D. Satter, University of Wisconsin)

A summary of the amount of dietary protein from various feedstuffs that escape microbial degradation in the rumen is listed in Table 1.

Table 1. In Vivo Estimates of Undegraded Protein

Feed	(%)	Feed	(%)
Barley	20	Corn Gluten Meal	55
Corn	50	Distillers Dried Grain	55
Linseed Meal	30	Blood Meal	65
Soybean Meal	30	Alfalfa Silage	20-30
Soybeans	20	Alfalfa Hay	30
Corn Gluten Feed	20	Bromegrass Hay	30
Brewers Dried Grain	50	Corn Silage	30

Factors affect protein degradation including protein cross-linkings (less degradable), time in rumen (shorter time lowers degradation), and processing (heat treating can decrease degradation). The quality of the undegradable protein can limit milk production. In one study, corn protein sources (distillers grain) resulted in 12.5 pounds less milk and 5.7 pounds lower dry matter intake compared to soybean meal as a protein source. Several strategies can be used for incorporating resistent proteins to feeding programs: (1) substituting pound for pound to increase milk production in high producing cows, (2) lowering protein level in the diet thus reducing feed costs, (3) using NPN (non-protein nitrogen) with resistent protein.

Fiber Passage (J. Welch, University of Vermont)

Rumen residence time and passage of feed control intake and digestibility. Most particles leaving the rumen are smaller than 1 mm. Materials with specific gravities less than 1.0 are ruminated and pass slowly. Small particle size and specific salts (buffers) increase the rate of passage of particles. Understanding these factors will optimize rumen digestion.

Chemical Factors (W.H. Hoover, West Virginia University)

A major factor involved in ruminal fiber digestion appears to be pH. Moderate depression in pH to 6.0 results in a small decrease in fiber digestion, but the number of fiber digesting organisms are not affected. Further decreases to 5.5

depresses microbial growth rates and fiber digestion. One reason for lower fiber digestion is a decrease in bacteria attachment to the fiber particle.

The presence of starch and sugars may increase the need for total nitrogen as both ammonia and amino acids. The value of amino acids for fiber digesting organisms appears to be primarily as sources of isoacids.

COMPUTER DAIRY RATION SCHOOL

A repeat of the successful dairy computer feeding program is scheduled for April 15 and 16 at the University of Illinois. Drs. Dave McQueen and Mike Hutjens will team teach an indepth 1-1/2 day clinic that will teach and allow each participant to use Illinois dairy feeding programs on IBM equipment (available in most Illinois Extension offices). Fifteen computers will be available at the College of Veterinary Medicine, allowing each farm unit to get direct hands-on experience. The $35 registration fee will include a copy of the latest version of the Illini Dairy Ration Analyzer plus lecture materials. Dairy producers should bring their feed rations, forage test results, and feed tags so they can accurately develop their 1987 feeding program. Enrollment will be limited to 15 farm units. Contact Mike Hutjens (217-333-2928) if you are interested in enrolling.

TRITICALE AS A FORAGE FOR DAIRY CATTLE

Triticale is a cross between wheat and rye. It combines the hardiness of rye with the grain quality of wheat. However, problems with ergot and lack of a market have discouraged its use as a grain. Recently, new varieties have been developed, and the potential of triticale as a forage crop has been considered. Two experiments at the Rosemount Experiment Station have been conducted to evaluate triticale as a forage crop.

In the first experiment, a winter hardy variety of triticale was planted September 18, 1984. Seeding rate was 100 pounds per acre. Nitrogen was applied at the rate of 92 pounds per acre, 46 pounds in the fall and 46 pounds in the spring. The triticale was harvested in the late boot stage (approximately 25 percent of the heads were emerged from the sheath) on May 24, 1985. The triticale was wilted to 40 percent dry matter (DM) and ensiled in silo bags. Yields averaged 4.1 tons per acre at 40 percent DM.

The triticale silage was compared to alfalfa and oat silages as a forage source for Holstein cows in early lactation. The alfalfa was harvested at mid bud stage, and oats at early heading. The oats did not receive any nitrogen fertilizer. All forages were ensiled at approximately 40 percent DM and stored in silo bags. The triticale and oats were well preserved in the bags and readily consumed. Slight spoilage was observed in the alfalfa, but it did not appear to affect intakes. Diets were composed of a 50:50 ratio of forage:concentrate (DM basis), balanced for protein and minerals and fed as a total mixed ration. Results of the production portion of the experiment are being summarized at the present time. A summary of forage quality is shown in Table 1. (J.C. Paulson, F.R. Ehle, D.E. Otterby, and J.G. Linn, University of Minnesota. Appeared in the 1986-87 *Minnesota Dairy Report*.)

Table 1. Forage Quality Analysis (DM Basis)

Forage	Crude Protein	NDF	ADF
	----------percent----------		
Alfalfa	20.7	43.8	32.9
Oats	13.1	54.8	32.1
Triticale	16.6	52.4	31.1

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Vol. 16, No. 2 April 1987

IN THIS ISSUE:

By-product Feeds

A comparison of current feed prices (March 1987; f.o.b. St. Louis) and break-even prices is listed in Table 1. Break-even prices were calculated based on $4 per hundred pounds of shelled corn and $8 per hundred pounds of soybean meal.

Rice bran, a new by-product feed, consists of the outside seed coat (bran) and germ removed in milling the rice for human use. It contains 14 percent crude protein (CP), 15 percent oil, and 13 percent crude fiber. Guidelines for feeding rice bran are 3 pounds per cow per day, or less than one-third of the total grain mixture (use is similar to wheat bran). The feed analysis can vary and oil may be extracted. Rancidity can be a problem.

If a dairy producer can purchase the by-product feed at or below the break-even price, the feed is a good buy. No value is given for oil forms of energy, low rumen degraded protein, or extra minerals, especially phosphorus.--*M.F. Hutjens, Extension Dairy Specialist*

A Dairy Producer's View on BST

About the author: Walter Stemler milks 155 cows near Waterloo, Illinois, with an average annual milk yield of 17,000 pounds per cow. He also chairs the Board of Directors of the St. Louis Division of Mid-American Dairymen, serves on the National Milk Producers Federation Board of Directors, and chairs the Federation's Animal Disease Advisory Committee. This presentation was made in January, 1987, to the Dairy Forum in Fort Lauderdale, Florida.

My assignment today is much like it was then . . . to give you the viewpoint on BST from a working dairy producer. Right off the bat let me acknowledge that BST is a hot topic. It provokes different reactions among different groups.

Researchers are excited about it. Animal rights activists are upset. The National Milk Producers Federation is cautious. Many consumers appeared misinformed. . . . a subject I want to return to later . . . and, finally, dairy farmers are confused about it.

Some dairy farmers strongly favor BST. They see it as just the latest development in a series of technology improvements that have made American dairy producers the most efficient in the world. They see it as a tool not for more milk, but the same amount produced at lower cost.

But other dairy farmers question BST. They question the advisability of increasing production when we have just about completed a program to slaughter dairy cows to reduce the milk surplus. As taxpayers, they question why the dairy industry should be subsidized through milk supports if it is going to adopt a technology that may increase milk production.

What is my position? It is that, in general, I support new technology. In the past, our industry has benefitted from improved feeding, breeding, and management techniques that include new milking methods and better production and storage facilities. These advances have made our work easier and kept us competitive. They have increased the average milk yield per cow from 5,800 pounds in the 1950s to more than 13,000 pounds today.

Last June, I told the House Subcommittee that we should not stop progress, but we should proceed with caution in endorsing such progress unless we are prepared to deal with its effects. In the case of BST, those possible effects could be far-reaching. I still feel this way.

So, too, does the Board of Mid-American Dairymen. Let me give you their position.

First, we urge that all agencies and individuals involved in the testing and approval of BST for use in the production of milk use restraint and care in their decision-making process. Specifically, we urge that there be unequivocal assurance that there is no negative health issue involved that would impact the favorable image of milk or dairy products in the eyes of the consuming public.

Second, we urge that the impact of BST use on herd health and on the milk production longevity of dairy cows be carefully assessed by long-term studies prior to general approval.

Third, we urge the assessment of the economic impact of BST, particularly with respect to existing supply/demand relationships and the benefits that may or may not accrue to dairy farmers in improving milk production costs in relation to prices received.

Earlier, I said that consumer perceptions were a special concern of mine. A St. Louis newspaper reporter recently interviewed me about BST. At one point she said that she did not want her family drinking milk from hormone-treated cows. She wondered if such milk was being sold in the St. Louis area.

I explained to her what BST is and the fact that the U.S. FDA has found milk from BST-treated cows safe for human consumption. She listened and learned. She ended our conversation more knowledgeable and comfortable about BST than she was when we began.

I drew two lessons from this episode. One, that Mr. and Mrs. Consumer will have many questions about BST, and two, that good answers to at least some of these questions do exist.

I don't mind discussing BST with folks, but I also feel that the main responsibility for educating consumers about this product rests with its manufacturers . . . not with the dairy producer or with dairy product processors. My sense is that the manufacturers understand the importance of this job and are committed to an effective public information program.

While consumer understanding is critical, it is not the only information needed on BST. Other important questions remain to be answered. They include:

--Will cows be under greater physiological stress and more prone to diseases such as mastitis?

--Is it the dairyman or the consumer who will primarily benefit from BST?

--Will it change the makeup of the dairy industry, that is, the size of farms, the number of farms, and the geographical locations for dairying?

--Will BST undermine the goal of the 1985 Farm law to cut milk production?

I know that research programs are being carried out by the manufacturers to answer these questions. Some of this work is being done to meet FDA requirements, and some of it is being done because the manufacturers are smart business people who want to know as much as they can about their product before they encourage us to buy it. I hope that today they will be able to answer some of the questions I've raised.

Let me close by urging my fellow dairymen to be both tough and fair on BST. Let's continue asking the tough questions about its long-term effects. But let's also be fair in giving the companies a chance to answer. Let's keep our minds open on this potentially helpful new product, while keeping a watchful eye for information as it develops.--*Walter Stemler, Illinois Dairy Producer*

Bovine Somatotropin (STH) and Human Safety

The potential commercial use of bovine somatotropin (STH) has raised questions concerning safety of milk and meat from cows given STH. Research conducted to date indicates that bovine STH does not endanger the health of the animal receiving STH, the dairy producer using the product, or the public consuming the products. For example, the Food and Drug Administration (FDA) authorized American Cyanamid Company to market the milk from cows treated with recombinant bovine STH. Approval also was granted for slaughter of treated cows (zero day withdrawal) for food purposes. The FDA approval of the marketing of this milk was based on their judgement that the marketing of the milk would be consistent with their interests in public health.

Three main factors appear to assure the safety of milk and meat from cattle given exogenous STH:

1. Somatrotropin normally is secreted into milk and has been detected in milk from untreated cows. Recommended doses of exogenous STH injected into cows do not increase normal concentrations in milk. A recent study showed the range of detected STH in milk from control and STH-treated cows was similar for both groups. From these

studies it was concluded that exogenous STH treatment results in little or no change in milk STH concentrations.

2. Bovine STH is a small protein molecule (191 amino acids) and is rapidly attacked by proteolytic enzymes and hydrochloric acid secreted by the digestive tract. After consumption, the small amount of STH in milk either from natural secretion or from injection, would be denatured and broken into peptides and amino acids similar to normal protein digestive processes. Small peptide or amino acid fragments of STH have no somatotropin activity.

3. Bovine STH is not active in man. This species specificity was recognized from studies conducted in the 1950s to determine the physiological effects of bovine STH in monkeys and man. The results were negative. Later studies demonstrated that human STH was physiologically effective in the rat, but bovine STH was virtually inactive in man and other primates. The reason for the variability in responses was shown to be related to structural differences in the STH molecules.

In conclusion, milk from cows treated with somatotropin is not different from milk from untreated cows and appears to be as safe for human consumption as any other wholesome milk currently produced.--*C.G. Soderholm, D.E. Otterby, and J.G. Linn, University of Minnesota. Reprinted from the 1986-1987 Minnesota Dairy Report*

Illinois Youth Dairy Judging Contest

Urbana--Entries are being accepted for the Second Illini Dairy Club 4-H and FFA Spring Invitational Dairy Judging Contest to be held at the University of Illinois dairy farms on South Lincoln Avenue, Urbana.

The contest will be held on May 2. Registration for 4-H and FFA teams will start at 9:45 a.m. Judging begins at 10:30 a.m.

Teams will consist of three or four members, with the top three scores counting as team score. Any 4-H clubs and/or counties may enter as many 4-H division teams as they wish. All 4-H members are eligible except those who have previously been members of the Illinois 4-H Senior Dairy Judging Team.

FFA chapters may enter as many FFA division teams as they wish. All FFA contestants must be high school students. No contestants may compete in both the 4-H and FFA divisions.

Oral reasons (two sets) will be optional for both 4-H and FFA teams. Individual awards will include reasons and placings for top awards, while team competition in both 4-H and FFA will be based on placings only. The high individual in the 4-H division also will receive a traveling trophy, which has been awarded every year since 1969 in a similar contest. Second- and third-place individuals and teams in both divisions will receive ribbons.

All individuals, including a team's fourth contestant and individuals who are not team members, are eligible for individual awards.

First-place plaques and the traveling trophy will be awarded at The Illini Dairy Club Spring Banquet on May 10.

Entries should include names of entering individuals, number of entering teams, and division entered. Send entries to Illini Dairy Club, Attention: Wayne Bingham, 315 Animal Sciences Lab, 1207 W. Gregory Drive, Urbana, Illinois 61801. --*M.F. Hutjens, Extension Dairy Specialist*

Research Update

Several research reports are summarized and discussed. For more details, contact the university and researcher listed or the dairy extension office.--*M.F. Hutjens, Extension Dairy Specialist*

Protein Preservation in Upright Storage Units

Alfalfa silage from 38 oxygen-limiting structures (OLS) and 43 conventional upright silos (CUS) were analyzed for nutrient content (see Table 2).

Storage structure did not significantly affect the total protein or fiber levels. Alfalfa stored in OLS had more insoluble protein (greater rumen escape protein) but had more bound protein (which is unavailable). The greater the forage dry matter (DM) stored in OLS resulted in more insoluble protein (nitrogen) and ADF nitrogen (indiciating less protein breakdown and deamination and more heating). Forage stored in CUS followed a similar trend. *Research conclusion*: Alfalfa haylage must be stored at optimal DM to minimize nutrient losses. Either system will successfully preserve forage quality with correct management.--*C.C. Stallings, Virginia Polytechnic Institute*

Vitamin E Requirements of Dairy Calves

Thirty-two Holstein calves were supplemented with 0, 125, 250, or 500 I.U. of vitamin E per day. Overall weight gains at 24 weeks were higher with 125 and 250 I.U. than controls; 500 I.U.-supplemented calves were intermediate. Unsupplemented calves had higher cytoplasmic serum enzymes indi-

cating cell membrance damage. Blood hematological responses were lower in calves at the highest levels. Research conclusion: Supplementing conventional calf rations with 125 to 250 I.U. of vitamin E can improve performance.--*J.L. Morrell, Kansas State University*

Predipping Residues

Pre and postmilking teat dipping with a 0.1 percent iodophor teat dip did not increase iodine residues in milk above postmilking dipping with a similar product alone. Using a 1 percent iodophor increased iodine milk residues. Manual drying of teats with a single service towel was done at predipping. *Research conclusion*: Predipping with a disinfectant needs to be monitored to minimize iodine residues in milk. Use of a low iodine (0.1 percent) predip does not contribute significant amounts of iodine to milk.--*D. Galton, Cornell University*

Protein and Energy Relationships in Dairy Cow Rations

Increasing the crude protein content of isocaloric (equal energy) diets from 11 to 20 percent increased the net energy value of the ration. Lowering rumen solubility of the ration protein was associated with a further increase in energy value of the ration. Manipulation of protein in the concentrate appears to have more effect on energy values than changes in forage protein through improved intake. Dietary protein effects on energy value of feeds for lactation appear to be through a reduction in depression of digestive efficiency associated with the higher intake needed for higher milk production. *Research conclusion*: The level and type of dietary protein can influence energy value of a ration.--*H.F. Tyrrell, USDA, Beltsville*

Effect of Selenium on Immune Response

Eight Holstein calves that were either selenium deficient or supplemented were challenged with IBR (infectious bovine rhinotracheitis). White blood count and plasma glutathione peroxidase activity were consistently higher in selenium-supplemented calves. Glutathione peroxidase activity is highly correlated to selenium status of animals. The first challenge with IBR results in high IgM levels (antibody disease protection) on day 7 with selenium-supplemented calves. Serum IgM concentrations were consistently higher for the supplemented calves throughout the study. *Research conclusion*: Selenium supplementation can stimulate antibody production to improve resistance to infection and disease.--*J.W. Spears, North Carolina State University*

Incidence of Metabolic Disorders

Interrelationships of metabolic disorders were investigated in 8,521 calvings of dairy cows examined between 5 to 16 days postpartum (see Table 3).

Ketosis was defined as urine with an acetoacetate concentration of 0.5 millimole per liter. Acidosis was measured as urine with a pH below 7. Metritis was diagnosed as a cow having a foul-smelling, colored discharge removed from the cervix dring postpartum examinations. As cows increased in parity (calving number), the risk of milk fever, ketosis, displaced abomasum, and acidosis increased. Metritis was higher in heifers than in cows. *Research conclusion:* Metabolic diseases must be monitored and controlled as cows age. A balanced diet can minimize disorders.--*O. Markusfeld, Hachaklait, Israel*

Table 1. Economic Comparison of By-product Feeds

Feed	Current price (dollars per ton)	Break-even price (dollars per ton)
Wet brewers grain (30% DM)	$ 28	$ 34
Dried brewers grain	$ 75	$104
Dried corn gluten feed	$115	$106
Wet corn gluten feed	$ 55	$ 47
Dried distillers grain	$120	$113
Whole cottonseed (semiload)	$165	$101
Raw soybeans	$160	$148
Wheat middlings	$ 50	$ 95
Hominy	$ 58	$ 87
Beet pulp	$220	$ 66
Rice bran	$ 35	$ 71

Table 2. Nutrient Characteristics of Forage

	OLS	CUS
Dry matter (%)	56.0	44.4
NDF (% DM)	48.1	49.9
ADF (% DM)	40.1	39.5
Crude protein (% DM)	20.0	19.8
Soluble nitrogen (% total)	52.8	59.5
ADF nitrogen (% total)	14.0	11.0

Table 3. Incidence Rates and Ranges of Traits

	Number of calvings	Rate %	Range
Milk fever	8,521	1.4	0.7 - 2.3
Prolapsed uterus	8,521	.3	0.1 - 0.7
Retained placenta	8,387	17.8	15.1 - 23.3
Metritis	8,387	36.1	24.8 - 51.3
Displaced abomasum	8,387	1.7	0.9 - 2.5
Ketosis	2,954	30.4	29.3 - 35.3
Acidosis	2,954	29.5	17.0 - 45.4

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Vol. 16, No. 3 October 1987

IN THIS ISSUE:

Lasalocid for Replacement Heifers

The U.S. Food and Drug Administration (FDA) recently approved the usage of lasalocid sodium (marketed as Bovatec) for inclusion in diets of dairy replacement heifers for increased weight gain. The clearance allows 60-200 mg of lasalocid/head/day to be fed based on size with no age or weight restrictions. A current review of all grazing trials with ionophores would suggest 150 mg of lasalocis/head/day to be an optimum level of consumption. Table 1 indicates inclusion levels of lasalocid necessary to achieve various intake levels of the active ingredient.

Lasalocid should be thoroughly mixed with the grain or mineral supplement to ensure uniform intake. No feed refusal or palatability problem should occur. Lasalocid should be removed from the ration once the heifer has calved (not cleared for milk or dry cows). It also functions as a coccidostat in ruminant animals. Dairy producers should consider lasalocid or monensin (marketed as Rumensin) if heifer growth is suboptimal (less than 1.6 lb/day for large breed heifers, 1.3 lb/day for small breed heifers) resulting in heifers that are over 24 months of age at calving.--*M.F. Hutjens, Extension Dairy Specialist*

Costs to Produce Milk

Margins continued to improve for Illinois dairy producers in 1986, but returns still did not cover total costs, according to figures summarized by University of Illinois agricultural economists in cooperation with the Illinois Farm Business Farm Management (FBFM) Association. Individual records tabulated were from farmers enrolled in the FBFM record-keeping and business analysis program.

A detailed breakdown by herd size of 1986 milk production costs and returns for dairy farms is shown in Table 2. Farms

Table 1. Amounts of Botatec 68 to Add with Grain or Mineral Supplements to Achieve Specified Levels of Lasalocid Consumption (500 lb mixtures)

	mg/head/day			
	68	108	163	204
Carrier				
Grain supplement (1 lb/head/day				
Bovatec 68[a]	0.5	0.8	1.2	1.5
Grain	499.5	499.2	498.8	498.5
Mineral supplement (2 oz/head.day)				
Bovatec 68[a]	4.0	6.4	9.6	12.0
Mineral mix	496.0	493.6	490.4	488.0

[a]Bovatec 68 contains 68 grams of lasalocid per pound of premix.

Table 2. Costs and Returns for Illinois Dairy Enterprises, by Herd Size, 1986

	40 to 80 cows per herd	More than 80 cows per herd	All units
Number of farms	123	57	180
Average tillable acres per farm	297	425	338
Average number of cows per farm	59.4	103.4	73.3
Average milk per cow, pounds	15,369	15,911	15,541
Average beef produced per cow, pounds	603	587	598
Costs per cow, milk plus beef	$ 2,157	$ 2,162	$ 2,159
Average returns from beef	267	273	269
Net costs for milk per cow	1,890	1,889	1,890
Return from milk per cow	1,815[a]	1,873[a]	1,833[a]
Return above all cost	$ - 75	$ - 16	$ - 57
Cash costs per 100 pounds of milk produced,			
Feed	$ 5.44	$ 5.31	$ 5.40
Operating expenses,			
Maintenance and power	$ 1.25[b]	$ 1.23[b]	$ 1.24[b]
Livestock expense	.94	.98	.95
Insurance, taxes, and overhead	.27	.25	.26
TOTAL operating expenses	$ 2.46	$ 2.46	$ 2.45
Other costs per 100 pounds of milk produced,			
Depreciation	$ 1.11[c]	$ 1.11[c]	$ 1.11[c]
Labor	1.84	1.49	1.73
Interest charge on all capital	1.43	1.51	1.46
TOTAL other costs	$ 4.38	$ 4.11	$ 4.30
Total nonfeed costs per 100 pounds of milk produced	$ 6.84	$ 6.57	$ 6.75
Total all costs per 100 pounds of milk produced	$12.28	$11.88	$12.15
Net price received per 100 pounds of milk produced	$11.81	$11.77	$11.80
Return above all costs per 100 pounds of milk produced	$ - .47	$ - .11	$ - .35

[a]ACSC payments for government dairy reduction program were not included.
[b]Includes utilities, machinery, equipment and building repairs, machines hired, and fuel.
[c]Includes machinery, equipment, and building depreciation.

included had no other livestock, with all costs accounted for either in crops or in the dairy enterprise. Total costs for the dairy enterprise were reduced by income from sales of dairy animals or from an inventory increase in pounds of beef produced during the year. The value of the added pounds was figured at the average price received for all weights of dairy animals sold in the past five years. The residual costs--88 percent of the total enterprise costs--were the net cost of producing milk. The feed cost includes on-the-farm grains evaluated at average Illinois market prices for the year, with corn at $2.01 per bushel and oats at $1.20 per bushel. Commercial feeds were listed at actual cost, hay and silage at farm values, and pasture at 40 cents per animal per pasture day.

Herds with more than 80 cows not only produced more milk per cow but did so more cheaply. Compared with herds of 40 to 80 animals, larger herds produced an additional 542 pounds or 4 percent more milk per cow. Total costs for each 100 pounds of milk produced were 40 cents lower for the larger herds. Labor costs, which were 35 cents less per 100 pounds produced, accounted for most of the difference. For each 100 pounds of milk produced, large herds also averaged 13 cents lower feed costs. The trend in total costs and returns per cow for all herds is given from 1983 to 1986 (Table 3). When cash and noncash costs are figured, the profit margin (return above all cost) increased--from $-170 in 1985 to $-57 per cow in 1986. The last year that returns exceeded total costs was 1979.

While beef prices have stabilized, milk prices continue to decline. Costs, which have been increasing throughout the seventies and early eighties, have been declining since 1984. Lower feed costs and interest charges were the main factors in this decrease in costs. Higher milk production per cow has held returns from milk per cow at stable levels even though the price received for milk has been decreasing. Since 1981, the price received for milk has dropped 11 percent while pounds of milk produced per cow has increased 12 percent. Feed costs will remain relatively low in 1987 as abundant feed supplies will continue. Feed costs per 100 pounds of milk produced in 1986 were at the lowest level since 1978 and 20 percent below the 1984 feed cost. In 1986, feed costs made up 44 percent of the total cost to produce milk.

The production cost difference between large and small herds--36 cents per 100 pounds of milk produced for 1986--is expected to increase or to continue at the same level. Increased milk production per cow--through better management--combined with the ability to spread labor and other fixed costs over more units of production, is making larger herds more competitive. But, like most other livestock farmers, the dairy farmers who have large amounts of unpaid family labor and who use little borrowed money can best withstand long periods of negative profit margins.-- *D.H. Lattz, Extension Farm Management Specialist*

Selenium Levels for Dairy Cattle

Earlier this year, the U.S. Food and Drug Administration (FDA) approved an increase in the level of selenium in livestock feed. Selenium is a trace mineral required by animals, which affects reproductive performance and health.

The new FDA maximum level in total ration day matter is 0.3 ppm (parts per million) or milligrams per kilogram of feed, up from 0.1 ppm. For dairy cows, four to six milligrams of added selenium are recommended. Dairy managers should supplement the higher levels.

However, dairy managers should check tags because several potential problems exist. Companies may not change to the higher level immediately due to feed tag, inventory, and formulation restrictions. Excessive selenium intake due to multiple sources of the new higher supplemental selenium (trace mineral, protein, and/or premix sources) should be avoided.

Dairy managers should carefully review feeding programs to insure optimum selenium levels are fed to calves, heifers, dry cows, and milking cows.

Blood selenium can be used to monitor animal status (over 0.10 ppm in whole blood). Vitamin E should also be added because it functions biologically with selenium (200 to 400 units per cow per day).--*M.F. Hutjens, Extension Dairy Specialist*

The "Best" Teat Dips

Postmilking teat dipping with an effective germicidal teat dip will reduce the number of new infections by about 50 percent. This is more important than all of the other milking hygiene practices combined in reducing new infections by contagious bacteria.

To be certain that a teat dip is effective, it should be tested under field conditions. Of the many products on the market, very few have been tested on enough cows for a long enough time under field conditions. Chlorhexidine acetate (0.5 percent), iodophor (0.5 to 1.0 percent available iodine), and hypochlorite (4 percent) dips have been shown to effectively reduce new infections in multiple controlled field studies. Hypochlorite compounds may cause irritation and should have less than 0.5 percent sodium hydroxide to minimize teat

Table 3. Costs and Returns per Cow for Illinois Dairy Enterprises, 1983 to 1986

	1983	1984	1985	1986
Number of farms	211	177	184	180
Number of cows	73	70	69	73
Net cost for milk, per cow	$2,096	$2,130	$2,022	$1,890
Return from milk, per cow	1,831	1,810*	1,852	1,833
Return above all costs, per cow	$ -265	$ -320	$ -170	$ - 57
Price received per 100 pounds of milk	$12.63	$12.50	$12.28	$11.80
Price received per 100 pounds of beef	$45.64	$43.92	$44.23	$43.21
Milk produced per cow, pounds	14,496	14,483	15,076	15,541

*ASCS payments for government dairy reduction program were not included.

chapping and irritation. Dodecyl benzene sulfonic acid, at a concentration of 1.94 percent, has been shown to be effective in a limited number of herds in several studies.

Recently, there have been questions about the National Mastitis Council (NMC) testing teat dips. They do not. No organization or government agency tests teat dips; however, the NMC has three protocols or methods by which teat dips can be tested. *Protocol C* evaluates a teat dip's ability to prevent infections in dairy cows under commercial dairy practices and *determines effectiveness under natural conditions.* Dairy farmers should be interested in results of trials using *protocol C.* These trials should show that the teat dip reduces new mastitis infections by 50 percent or more under natural conditions.

Dairy farmers should also only use teat dips that are listed with the FDA. The FDA does not test teat dips for effectiveness; however, they do regulate teat dips as over-the-counter drugs. If the teat dip complies with FDA rules, the label will state clearly the product name, percentage concentration of each active ingredient, directions for use, name and address of manufacturer or distributor, production lot number, and an expiration date.

Dairy producers need to be sure that the lower one-third of the teat is covered with an effective teat dip immediately after every milking. Dipping or spraying can be used to apply the teat dip. Dipping has the advantage of insuring thorough coverage of the lower teat.

Teat dipping is very effective in preventing the spread of the contagious pathogens *Staphylococcus aureaus* and *Streptococcus agalactiae*, which cause the majority of mastitis in most herds. Dairy farmers need to remember that teat dipping does not eliminate existing infections. Existing infections are best eliminated by dry cow therapy and culling chronic cows. A program that combines the prevention of new infections, which would include teat dipping, and the elimination of existing mastitis should reduce the somatic cell (leukocyte) count in a dairy herd. Changes will not occur overnight.

Dairy farmers should only use teat dips that are listed with the FDA and are shown to effectively reduce the infection rate in controlled research studies. Teat dip manufacturers and/or suppliers should be able to provide this information to dairy managers.

Teat dipping is one important part of a five-point mastitis control program that includes:

1. Teat dipping immediately after every milking;
2. Use of good milking management procedures;
3. Treatment of every quarter at drying off;
4. Prompt treatment of clinical cases; and
5. Culling of chronic mastitic cows.

When the entire mastitis control program is used, it will return at least $5 for every $1 invested.--*William L. Crist and Robert J. Harmon, Animal Science Dept., University of Kentucky*

Heifer Artificial Insemination (AI) Return

Heifers offer several unique opportunities to make AI really pay. First, they tend to be the best animals genetically in most herds. Breeding them using AI allows the herd to benefit fully from their superiority. Second, they tend to be quite fertile because they haven't endured the stress of calving or high production. Table 4 shows what semen budgets for heifers, fertile cows, and problem breeders should be if (1) the overall semen budget was $15 per unit, (2) problem breeders had 30 percent conception, (3) after three services, cows and heifers were considered "problem breeders," and (4) the dairy farmer spent the same percent of a total semen budget on each group as the percent of herd replacements coming from that group. Heifers deserve the greatest investment in semen because they are most likely to conceive. The more fertile they are relative to older cows, the more the dairy farmer can spend per unit of semen to get them bred.--*Bennet G. Cassell, Extension Dairy Scientist, Virginia*

Research Update

Several research reports are summarized and discussed. For more details, contact the university and researcher listed or the dairy extension office.--*M.F. Hutjens, Extension Dairy Specialist*

Substituting Wheat for Corn

Three concentrate grain mixtures consisting of 75 percent corn with 12 percent protein, 75 percent wheat with 15 percent protein, and 75 percent wheat with 12 percent protein were fed. Alfalfa hay was the only forage fed at a 50:50 forage-to-concentrate ratio. Intake of dry matter was lower for cows fed wheat rations. The control (corn diet) cows yielded 76 pounds of milk while the higher protein-wheat based ration produced 74.1 pounds of milk and 72.6 pounds for the low protein wheat diet. No effect on fat or protein test occurred. *Research conclusion*: Wheat in dairy cow rations should be limited to 50 percent and the supplemental protein levels maintained. More research will be needed.--*L.J. Bush, Oklahoma State University*

Fiber Source for Ruminants

Beef cattle and sheep were used to rank various crop hull residues based on total tract digestibility of dry matter, organic matter, and fiber. The ranking (best to poorest) was corn fiber, soybean hulls, oat hulls, and cottonseed hulls. Corn fiber and soybean hulls responded as concentrate-type feeds. *Research conclusion*: All by-product feeds have potential as feedstuffs for ruminants but should not be considered equal.--*D.B. Faulkner, Extension Beef Specialist, University of Illinois*

Temperature and Fat Effects on Calves

Average daily gains (pounds/day) over a three-week trial for 36 calves fed 10, 17.5, and 25 percent fat diets were -0.08, + 0.04, and 0.20 at -4°C and + 0.33, + 0.48, and 0.42 at 10°C. Rectal temperatures were lower for calves at -4°C than at 10°C and for calves fed 10 percent versus 25 percent fat diet. Calves housed at -4°C had higher maintenance energy requirements. *Research conclusion*: Calves housed at -4°C required 32 percent more energy for maintenance than calves housed at a temperature within their thermoneutral zone. --*L.D. Muller, Pennsylvania State University*

Table 4. Economic comparisons of semen costs and breeding efficiencies

Estimated conception rate		Amount a dairy farmer can spend per unit on each group and average $15 overall		
Percent		Fertile		Problem
Cows	Heifers	Cows	Heifers	Breeders
40	50	$15.16	$18.95	$11.37
	70	13.92	24.36	10.44
50	60	15.37	18.44	9.22
	70	14.71	20.59	8.82
60	70	15.17	17.70	7.58

Cow Index Guidelines

The July 1987 USDA-DHIA Elite Cow Index (CI) levels are listed in Table 5. The cow qualified if she was registered, had an average of at least three modified contemporaries across lactations, her last calving was on or after April 1, 1985, and she was alive on the last termination code.

The CI$ (gross income) was computed using a price of $11.20 per hundredweight of milk with 3.5 percent fat and a fat differential of 16.8 cents. This was the U.S. average milk price for 1986 minus the average hauling, price support, and promotion assessments. The CI for fat percentage was computed with breed averages published in connection with the base change.--*F.N. Dickerson, Animal Improvement Lab, USDA, Beltsville, Maryland*

M.F. Hutjens

M.F.Hutjens
Extension Dairyman

Table 5. Percentiles and Corresponding Cow Index Dollars (CI$) for a Cow to be Designated Elite and Numbers of Elite Cows by Breed

Breed	Minimum percentile	Minimum CI$	Number of elite cows
Ayrshire	98	69	292
Brown swiss	98	98	458
Guernsey	98	85	693
Holstein	99	125	8,158
Jersey	99	100	1,052
Milking shorthorn	97	101	89
Red and white	97	99	70

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

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IN THIS ISSUE:

1988 Dairy Days

"Focus on the Future" will be the theme of a series of programs held in January for dairy producers throughout Illinois. Sponsored by the University of Illinois Cooperative Extension Service, Department of Animal Sciences, and the Illinois Department of Energy and Natural Resources, "Dairy Days" will allow producers to hone their management skills to meet the challenges of the future. Each meeting will feature advice from specialists on dairy feeding, herd health, and forage management.

Mike Hutjens, Extension dairy specialist, will present a program on "Building and Delivering Grain Rations." Ed Jaster, University of Illinois dairy management specialist, will speak on "Forage Preservation and Utilization," and Dave McQueen, University of Illinois Extension dairy veterinarian, will provide an update on Johne's disease and teat dips.

Those interested in attending should contact their local Extension adviser. "Dairy Days" dates and locations are:

January 11, Kankakee, Redwood Inn
January 12, Marengo, Cloven Hoof Restaurant
January 13, Freeport, Masonic Temple
January 13, Elizabeth, Community Building*
January 14, Sterling, Emerald Hill Country Club
January 15, Pekin, Agricultural Center
January 19, Quincy, Farm Bureau Building
January 20, St. Libory, American Legion Hall
January 21, Breese, American Legion Hall
January 22, Teutopolis, Knights of Columbus Hall

*Two meetings are held on January 13 and the order of speakers will be reversed at Elizabeth--*M.F. Hutjens, Extension Dairy Specialist*

By-product Feeds

Recent feed prices reported by dairy farmers in Illinois indicate some feeds are good buys compared to soybean meal (as a protein source) and shelled corn (as an energy price). Table 1 lists calculated break-even prices using shelled corn at $80 per ton and soybean meal at $200 per ton.

Table 1. Price Comparisons of By-product Feeds

Feed	Farm price	Break-even price
	----------*dollars*----------	
Beet pulp	240	68
Brewers' grain (dry)	113	123
Corn gluten feed (dry)	110	135
Distillers' grain (corn)	130	126
Soyhulls	50	88
Cottonseed (whole)	150	114
Soybeans (raw)	153	180

If a farmer can purchase the by-product feed and have it delivered to the farm for less than the break-even price, it is a good buy. Break-even price constants (Morrison values) do not consider higher undegradable protein value or fat as an energy source.--*M.F. Hutjens, Extension Dairy Specialist*

Heat-treated Soybeans

Soybeans (full fat beans) are raised and available on many Illinois dairy farms. Dairy producers are interested in using soybeans because the beans contain 18 percent oil and 38 percent protein, are palatable, and do not represent an out-of-pocket feed cost.

Raw soybeans can be fed at the rate of 3 to 4 pounds per cow per day. Processing the raw bean (rolled, cracked, or ground) minimizes the passing of the whole bean through the digestive tract intact, which provides no feed value. Feeding the whole bean avoids rancidity problems and oily feed from beans ground too fine. Coarse processing of soybeans is recommended.

Heating soybeans can destroy trypsin-inhibitor (an enzyme that decreases protein digestion), minimizes oil rancidity, and allows soybeans and urea to be combined in grain mixtures, because heating destroys urease. In addition, heating can reduce protein degradation in the rumen. The heating process must be hot enough to produce beneficial results, but not cause heat damage. The optimal temperature for heating soybeans is 320°F.

Wisconsin research illustrates the importance of heating and time after heating before cooling the beans (Table 2).

Table 2. Effect of Time (After Heating Before Cooling) on Protein Degradation

	Post roasting time (hours)	Undegraded protein (percent of total)
Raw beans	none	39
Roasted beans	0	50
	1/2	69
	1	75
	2	71

Higher levels of undegraded protein are beneficial to high producing dairy cows. In another study conducted at Wisconsin, popped soybeans were lower in undegradable protein compared to soybean meal. The cost of heat treatment, which varies from $15 to $50 per ton, must also be considered.

All heat treatment processes will not improve the feed value of soybeans. Dairy managers should evaluate various processes for cost, benefits, and effectiveness.
--M.F. Hutjens, Extension Dairy Specialist

Feeding Inert Fats

Energy continues to be the first limiting nutrient for dairy cows in early lactation. A minimum level of fiber (19 percent acid detergent fiber (ADF)) and maximum level of soluble carbohydrate or starch (35 to 40 percent) limits the amount of concentrate that can be fed. Adding fat, which contains 2.25 times more energy per pound of dry matter, can meet energy needs, resulting in more milk, high fat test, less health stress, and improved reproductive performance.

Inert fats are "new" commercial products that have little or no negative effect in the rumen due to the fat's physical or chemical structure. Fats (such as soybean oil, corn oil, and animal fat) can reduce rumen fiber digestion, lower rumen pH, and alter rumen volatile fatty acid patterns. These negative changes can cause off-feed, looseness, and low milk fat test.

The cost of inert fats range from 35¢ to 45¢ per pound. A partial list of these products available in the Midwest include Megalac (manufactured by Church and Dwight), Prilled or Energy Booster (marketed by Milk Specialities), Booster Fat (marketed by Balanced Energy Company), and Alifet (produced by Alifet USA, Inc). The level of fat varies from 80 to 100 percent in these products.

Strategies in using these inert fat sources include: (1) adding inert fat after one pound of added unprotected fat has been provided by oilseeds or animal sources; (2) adding inert fat when rumen conditions are borderline acidic; and, (3) adding inert fat when weight losses and energy limitations are critical. Palatability of these products may restrict use as a topdress. Economics will dictate feeding inert fats only to cows that need them and will respond.
--M.F. Hutjens, Extension Dairy Specialist

Canola Meal for Dairy Cattle

Canola meal is produced from new cultivars of canola oilseeds low in erucic acid and glucosinolate. These products are superior to older rapeseed cultivars. The Canadian government, processors, and traders have agreed to call these newer cultivars canola seed, oil, and meal.

The nutrient content of canola meal compared to soybean meal is shown in Table 3.

Researchers from Canada, California, Oregon, and Japan suggest the following levels of canola meal: 20 percent of the ration for calves; 25 percent of the grain mixture for dairy cows; and 20 percent of the grain mixture for beef

Table 3. Composition of Canola and Soybean Meal (on an As-fed Basis)

	Canola meal	Soybean meal
	percent	
Crude protein	37.20	45.20
Lysine	2.21	2.82
Methionine	0.76	0.70
Crude fiber	11.40	7.30
TDN	64.00	72.00
Fat	3.40	0.80
Calcium	0.68	0.29
Phosphorus	1.17	0.65

Source: Canola Council Pub #59, 1986

cattle. The protein is similar in rumen degradable to soybean meal. A mixture of canola and soybean meal may be desirable. Inclusion of canola meal should be based on cost per unit of protein relative to other sources. The whole seed should be cracked before feeding with a maximum of 5 to 10 percent of the concentrate mixture. Higher levels of the seed caused a lower fat test.--*M.F. Hutjens, Extension Dairy Specialist*

Keeping Up with Research

Articles that appeared in a recent issue of the *Journal of Dairy Science* are summarized in the following sections. For complete copies of the articles and further information, contact the author listed as source or our office. *--M.F. Hutjens, Extension Dairy Specialist*

Calf and Heifer Housing on Pennsylvania Dairy Farms

Research has established a link between calf and heifer housing and calf health. To determine current calf and heifer housing practices in Pennsylvania, 329 dairy farms were surveyed. All surveys were conducted on the farm by personal interviews. Results showed 24.9 percent of the farms had maternity pens in a building separate from the milking herd, although half of these farms used maternity pens in conjunction with facilities of lesser quality for the health and management of the animals (Table 4). The same number of farms used calf hutches as those keeping calves in dairy barns with cows. A high percentage of the farms weaned calves (switched from milk diets to dry feed diets) in recommended types of facilities that included group pens, loose housing, and group or superhutches (Table 5). However, 49.5 percent of the facilities used for weaned calves housed other dairy animals as well. Animal restraint facilities have also been identified as an area that needs more emphasis on dairy farms. Many areas of dairy replacement housing on commercial dairy farms were determined to be unsatisfactory according to recommended standards (Table 6).

Table 4. Type of Calf Housing Used[a]

Housing type	Percent
Calf hutches	44.7
Year round use	33.4
Summer only	9.7
Winter only	1.6
Elevated stalls (wood or metal) in dairy barns	4.5
Elevated stalls (wood or metal) not in dairy barns	4.8
Individual pens in dairy barns	12.4
Individual pens not in dairy barns	13.7
Tied (not penned)	28.2
Group pens	14.3

[a]Includes combinations when more than one type of system is used on a farm; therefore, percents do not equal 100.

Table 5. Housing Used for Weaned Calves

Housing type	Percent
Group pens only	53.8
Loose housing only	4.9
Group or super hutch only	3.0
Combinations of above three	12.6
Tied in barn	11.5
Individual pen or stall	1.8
Freestall	3.3
Other	9.1

Table 6. Problem Areas Specific to Replacement Housing as Perceived by Dairy Farmers

Problem	Own farm	Neighboring farms
Number	193	254
	percent	
General	44.6	42.1
Ventilation	17.6	22.8
Overcrowding	23.3	20.5
Labor	0.6	0.4
Sanitation	2.0	5.1
Restraint	3.1	1.6
Lack of feed bunk space	2.0	1.2
Others	7.1	6.3

Summary of research results: Dairy managers should evaluate their heifer housing facilities to allow for optimal growth while minimizing health and management limitations which can affect future milk production.--*A.J. Heinrichs, Pennsylvania State University*

Degradability of Protein Concentration and Protein Sources

Degradability of dry matter (DM) and crude protein (CP) was determined in situ (nylon bags placed in the rumen) for barley, canola meal, corn gluten meal, barley silage, and four concentrate mixtures. Crude protein percent of concentrate mixtures were barley plus canola (mix 1), 15.1; barley plus canola (mix 2), 21.0; barley plus corn gluten (mix 3), 17.1; and barley plus corn gluten (mix 4), 19.6. Degradability of each feedstuff was measured on each of four basal diets consisting of barley silage and one of the above concentrate mixtures fed in the proportion 40:60 (DM).

The resulting CP percent of diets containing concentrates 1 to 4 were 12.3, 16.1, 13.8, and 16.4. Effective degradability for DM and CP, assuming a constant rumen outflow rate, were: barley, 77.7 and 79.8; canola meal, 60.9 and 66.6; corn gluten meal, 18.9 and 11.0; barley silage, 47.0 and 81.1; mix 1, 76.4 and 77.4; mix 2, 72.5 and 71.8; mix 3, 72.8 and 55.8; and mix 4, 70.2 and 47.4. With two exceptions (DM degradability of mix 4 and CP degradability of mix 2), basal diet had no significant effect on effective CP or effective DM degradability. The measured crude protein degradability of concentrate mixtures 1 to 4 (77.4, 71.8, 55.8, and 47.4) was similar to degradability estimated on the basis of their ingredient content (75.7, 72.1, 49.6, and 43.0, respectively).

Summary of research results: The use of nylon bag estimations of protein degradation is an acceptable method to evaluate feed ingredients and concentrate mixtures. --*J.J. Kennelly, University of Alberta, Canada*

Mammary Gland Growth

The milk-secreting portion of the mammary gland is immature at birth and begins to grow at a faster rate than the whole body shortly before onset of puberty. This accelerated growth rate is maintained for several estrous cycles, then returns to a growth rate equal to general body growth. Growth of the mammary gland returns at conception and continues in most species for a variable period after parturition. Elevated secretion of estradiol and progesterone throughout pregnancy drives the mammary growth during pregnancy. However, mammary growth during lactation in cows is independent of ovarian secretions and prolactin. Mammary cell numbers during lactation eventually decline as milk production decreases. Concurrent pregnancy reduces mammary cell numbers during lactation, but during the dry period, concurrent pregnancy markedly increases mammary cell numbers over those in nonpregnant animals. Dry periods that are short reduce the increments in mammary cell numbers, which normally occur during early stages of the next lactation. Because numbers of mammary epithelial cells are a major determinant of milk yield, understanding the mechanisms that stimulate mammary epithelial cell numbers has the potential to lead to new methods for increasing efficiency of milk production.

Summary of research results: Mammary gland growth must be carefully managed to avoid problems in replacement heifers and optimize dry cow programs.--*H. Allen Tucker, Michigan State University*

Phosphorus Bioavailability Requirement of Calves

Bioavailability of phosphorus (P) from defluorinated phosphate and dicalcium phosphate and the P requirement were studied with 63 male Holstein calves. A P-depletion diet containing 0.08 percent total P on a dry matter basis was fed to all animals for 4 weeks beginning at 6 weeks of age and 134 pounds. Calves developed typical signs of P deficiency. The depletion period was followed by a 6-week experimental period in which the same depletion diet was used as a control. Phosphorus from each of the two sources was added to make diets containing 0.14, 0.20, and 0.32 percent total P. Source of supplemental P did not affect weight gains, feed consumption, feed efficiency, serum inorganic P, serum alkaline phosphatase, or bone ash.

Weight gains, feed intake, feed efficiency, and serum inorganic P were more sensitive measures of dietary P content than were serum alkaline phosphatase or bone ash. Growth rate, feed intake, serum inorganic P, and tibia joint ash each increased linearly with increasing dietary P. The data suggest that the P requirement of 2- to 4-month-old calves may need to be revised upward to 0.30 percent.

Summary of research results: Phosphorus levels in the total ration for calves should be 0.30 percent using various phosphorus sources if needed.--*W.J. Miller, University of Georgia*

Myths About High-producing Herds

Often when the topic of high levels of milk production is discussed, it is not unusual to hear doubts expressed. It is possible to go broke trying to achieve a 20,000 pound herd average. However, some of the doubts concerning high-producing herds are myths.

Myth #1--High-producing Herd Managers Can't Get Their Cows Bred Back.

Table 7. Comparison of Production Level with Reproductive Performance

Production level (lb)	Days open	Calving interval	1st breeding conception rate
12,000	149	14.9	58
14,000	139	13.8	52
16,000	130	13.5	51
18,000	127	13.4	50
20,000	130	13.5	49

As shown in Table 7, first breeding conception rate is slightly lower for higher producing herds. However, the opposite is true for days open and calving interval. This shows, with proper management (heat detection), a potential problem can be overcome.

Myth #2--High-producing Herds Have More Mastitis.

High-producing cows do not have more mastitis based on Dairy Herd Index (DHI) somatic cell scores (Table 8). In fact, just the opposite is true. High-producing herds have a lower average score with more cows in the low score categories. Healthy udders are essential for high levels of milk production.

Table 8. Comparison of Production Level with Somatic Cell Scores (SCC)

Production level (lb)	Cows SCC score (percent)				Average SCC score
	0 to 3	4 to 5	6	7 to 9	
12,000	40	37	11	12	4.0
14,000	46	36	9	9	3.7
16,000	50	35	8	7	3.5
18,000	56	31	7	6	3.3
20,000	66	24	5	5	2.9

Myth #3--High-producing Cows Burn Out.

Although the percent of cows entering the herd is higher for high-producing herds, the percent leaving the herd is similar across production levels (Table 9). Although individual dairy producers may move a higher percentage of cows in and out of their herds, this practice is not required to maintain a high herd production average. --*James W. Smith, Extension Dairy Specialist, University of Georgia*

Table 9. Comparison of Production Level with Percent Cows Entering/Leaving the Herd and Age

Production level (lb)	Entering herd	Leaving herd	Average age 1st calf heifers	Average age Older cows
	--------*percent*-------		--------*months*-------	
12,000	33	32	29	63
14,000	36	34	29	61
16,000	37	34	28	60
18,000	42	38	28	59
20,000	41	35	27	57

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Vol 17, No. 1 February 1988

IN THIS ISSUE:

Four-State Dairy Reproduction Seminar Series

Mark your calendar and plan to attend the second annual Four-State Dairy Reproduction Seminars. The featured topic for 1988 will be improving reproductive performance. Speakers from four states will present fast-moving programs and current research in the following areas:

Heifer Feeding to Calves at 24 Months--Dr. Terry Howard, University of Wisconsin
Nutrition and Reproduction--Dr. Mike Hutjens, University of Illinois
Reproductive Management: What's New--Dr. Jeff Reneau, University of Minnesota
Solutions for the Problem Breeder--Dr. Nolan Hartwig, Iowa State University

All meetings start at 10:30 a.m. A preregistration fee of $15 covers meals, materials, and facility charges. Locations and dates are:

February 29, St. Paul, Minnesota (Earl Brown Center, University of Minnesota)
March 1, Breese, Illinois (American Legion Hall)
March 2, Dubuque, Iowa (Loras College)
March 3, Arlington, Wisconsin (Public Events Building, University of Wisconsin)

Each meeting will allow time for questions and consultation.--*M.F. Hutjens, Extension Dairy Specialist*

U.S. Dairy Situation and Outlook

Due in part to the Dairy Termination Program, U.S. milk production declined 1 percent in 1987 (Table 1). Milk production per cow was up 3 percent or 400 pounds per cow in 1987, while cow numbers were down 3.5 percent. Commercial sales of dairy products are estimated to be 3 percent above 1986 sales. A strong economy, favorable dairy product prices, strong markets for cheese in and away from home and prepared food markets, and dairy product promotion programs have contributed to the unprecedented growth record.

Under the Food Security Act of 1985 (Farm Bill), the support price for milk must be reduced 50¢ per hundredweight (cwt) if an excess of 5 billion pounds of milk occurs (current estimates are 6 to 7 billion pounds). Thus, the price support is expected to be $10.60 per cwt. The Gramm-Rudman-Hollings Act or budget deficit reduction act is slated for a 2 percent cut of the budget or an additional 2 cents per cwt (total reduction of 52¢ per cwt).

Senator Leahy, chair of the Senate Agriculture Committee, has introduced legislation called the Dairy Farm Protection Act. This plan would keep the basic price support and purchase options, but on a regional basis. Six to ten regions would get a share of the government purchases. If a region exceeds its sales quota, farmers in that region would be required to pay an assessment to cover the cost of the over-quota sales.

Another impetus for further dairy policy discussions is the National Dairy Commission report due in April. An eighteen-member dairy farmer commission has held

hearings and examined options throughout 1987. It is not known what the commission will propose, but it will provide further fuel for discussion.

Higher feed prices, especially protein concentrates, may hold down production per cow, but a milk-to-feed price ratio of 1.45 and improved management favors increases in milk yield per cow.--*Dr. Andy Novakovic, Agricultural Economist, Cornell University (Material presented at the 1987 New York Dairy Congress)*

Table 1. U.S. Milk Supply and Utilization

Supply	1980	1985	Year 1986	1987[a]	1988[b]
	billions pound				
Marketings	126.2	140.7	141.5	140.7	144.6
Beginning stocks	5.4	4.9	4.6	4.2	4.1
Imports	2.1	2.8	2.7	2.8	2.8
	133.7	148.4	148.8	147.7	151.5
Utilization					
Commercial	119.1	130.6	134.0	137.8	141.2
Ending stocks	5.8	4.6	4.2	4.1	4.0
Government removed	8.8	13.2	10.6	5.8	6.3
	133.7	148.4	148.8	147.7	151.1

[a]Based on preliminary USDA data and Cornell estimates.
[b]Estimated assuming a $10.60/cwt price support and 2¢ per cwt assessment.

Feeding Dairy Steers

Of 17.8 million steers produced each year in the United States, about 27 percent are dairy breeding. A 100-cow dairy herd could increase income for labor and management by $100 to $200 per finished steer ($5,000 to $12,000). Fast-food franchises have found holstein beef very desirable. With the new grading standards, holstein steers will grade choice as readily as traditional beef breeds.

Housing facilities can be older dairy barns, pole barns, or other buildings which can be remodeled for a small investment. They should be ventilated properly, draft free, and easy to clean.

The feeding program for young bull calves is similar to that for replacement heifer calves (30 pounds of calf milk replacer and 200 pounds of calf starter). Calves can be grouped by 6 to 8 weeks of age and placed on a high-energy ration. Daily gains of 3 pounds per day or better and feed coversions of less than 6 pounds of feed per pound of gain can be achieved. Dairy steers should weigh 1,050 to 1,100 pounds at one year of age and 70 percent or better should grade choice. Total feed needs would be 2 tons of shelled corn (not ground), 500 pounds of hay or forage equivalent, and 500 pounds of protein supplement.

Calves should be dehorned, castrated, vaccinated, implanted, and fed an ionophore.

Disadvantages of dairy steer production are price variability in slaughter beef prices (forward pricing can minimize this risk), finding a desirable market, timing of sales, learning new management skills and feeding techniques, and purchasing healthy and disease-free calves (if more male calves are needed).--*M.F. Hutjens, Extension Dairy Specialist*

Economics of Mastitis

Mastitis, as indicated by elevated somatic cell counts (SCC), continues to cost Illinois dairy managers through lost milk production and profits (Table 2).

Table 2. Herd Averages by SCC Level for Illinois DHI Herds (December 1987)

SCC level (1,000)	Herds (number)	Herd size (cow number)	Daily milk (lb)	Herd average (lb milk)
153	159	62	45.5	17,345
296	381	70	43.6	16,494
482	113	66	41.2	15,706
665	33	53	36.8	14,607
903	15	53	36.8	14,325
1,078	8	49	32.7	14,060

The annual loss for the highest SCC group is $21,472 (12.8 pounds of milk x 305 days x 50 cows x 11¢ per pound) as compared to the lowest. Farmers must monitor and control SCC counts. If your dairy herd is not enrolled in the Illinois DHI SCC program, join today. As profit margins remain tight, mastitis losses cannot be tolerated.--*M.F. Hutjens, Extension Dairy Specialist*

New Dairy Publications Available

1. *1988 Illinois Dairy Report* is a 60-page booklet that features three talks presented at the Illinois Dairy Days and ten Illinois research reports. The booklet is available for $3 plus postage ($1.50).

2. *Feeding Soybeans to Dairy Cattle* (Revised Dairy Guide Number 5) discusses the nutritional value, effect of heat treatment, processing needs, recommended amounts, and guidelines for successful feeding of soybeans as a fat and protein source. The cost is 50c (including postage).

3. *Dairy Feeding Correspondence Course* consists of four home study units: meeting protein needs; energy requirements; micronutrients: minerals, vitamins, and additives; and phase feeding concepts. Each unit has questions to analyze and troubleshoot farm situations. The four units are available for $5 plus postage ($2.00).

Keeping Up with Research

Articles that appeared in a recent issue of the *Journal of Dairy Science* are summarized in the following sections. For complete copies of the articles and further information, contact the author listed as source or our office.--*M.F. Hutjens, Extension Dairy Specialist*

Feeding Value of Various Corn Grain Forms

Corn was harvested and stored as either dried shelled, dried ear, high-moisture shelled, or high-moisture ear. Shelled corns were rolled and ear corns were ground through a forage harvester. High-moisture corns were stored in sealed drums.

Unground dried shelled corn possessed the fastest rate of dry matter (DM) digestion and high-moisture ear corn the slowest. However, extent of digestion was greatest for high-moisture corns within 16 hours of ruminal exposure. Grinding increased the rate of shelled corn digestion. Nitrogen digestion rate was fastest for high-moisture ear corn and slowest for dried shelled corn. Grinding increased the rate of nitrogen digestion for all corn forms except high-moisture shelled corn. Dried shelled corn possessed the fastest rate of nonprotein DM digestion. Ratio of nitrogen to nonprotein DM rates ranged from 0.56 to 1.24 for dried shelled corn and high-moisture ear corn, respectively. Grinding narrowed this range.

Summary of research results: Nutrient availability can be altered by storage moisture, inclusion of cob, and grinding. High-moisture corn forms exhibit greater digestion in the rumen and more readily available rumen energy. Cob forms had higher levels of nondigestible DM which may be advantageous in providing effective fiber. Grinding increased DM digestion regardless of corn form.--*J.E. Nocek, Agway, Syracuse, New York*

Effects of Energy Level Prior to Calving

Two trials were conducted to study the effect of energy levels fed prepartum. In trial 1, 36 cows consumed 102, 131, or 162 percent of their energy requirement in the dry period. Blood glucose and ketone levels after calving indicated that the 131 and 162 percent groups were closer to ketosis. Displaced abomasum occurred more frequently in the 162 percent group. In trial 2, 40 cows were used to evaluate the effects of prepartum energy feeding for a longer period (including late lactation and dry periods). No negative effects were observed (based on blood metabolity and health measurements).

Summary of research results: Excessive energy consumption in the dry period can lead to serious health problems and no major productive advantages were gained.--*D.G. Grieve, University of Guelph, Canada*

Breakeven Costs for Embryo Transfer

Differences in Estimated Breeding Values expressed in dollars were compared by simulation of two 100-cow closed herds. One herd practiced normal intensity of female selection. The other herd generated various herd replacements by embryo transfer by varying: 1) selection rate of embryo transfer dams and 2) numbers of daughters per dam from which embryos were transferred. Average merit of all sires used increased $12 per year. Herd calving rate (0.70), proportion females (0.5), calf loss (0.15), and heifer survival rate (0.83) were used. Breakeven cost per embryo transfer cow entering the milking herd was computed by Net Present Value analysis using a 10 percent discount rate over 10 and 20 years. Breakeven cost or the maximum expense that would allow a 10 percent return on the expenditure ranged from $135 to $510 per surviving cow, $24 to $125 per transfer, $47 to $178 per pregnancy, and $81 to $357 per female calf born. As the number of replacements resulting from embryo transfer increased, breakeven cost per embryo transfer cow decreased due to diminishing return.

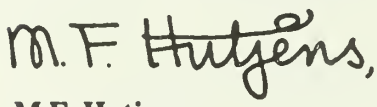
Summary of research results: Dairy farmers must economically evaluate if embryo transfer is a sound business decision.--*T.A. Ferris, Michigan State University, East Lansing*

Calcium in Dairy Products

Increasing attention has been given to the nutritional role of calcium because many Americans do not consume their Recommended Dietary Allowance (RDA) of this nutrient and because calcium deficiency may lead to the development of osteoporosis or other disorders. Calcium is

absorbed in the intestines with the aid of a vitamin D metabolite and is used in the body for many essential functions. There are several ways to obtain calcium in the diet, but the best sources are milk and other dairy products because of the low cost and high bioavailability of this mineral. Some manufacturers have responded to the concern over lack of calcium in the diet by increasing its levels in milk. The amount of calcium in cheese and yogurt also can be elevated.

Summary of research results: Dairy products provide the best dietary source of calcium since normal servings of milk, cheese, and yogurt contain substantial percentages of the RDA of calcium.--*M.H. Tunick, USDA, Philadelphia*



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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

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IN THIS ISSUE:

Memorial to Professor Gary Harpestad

Gerhard (Gary) W. Harpestad died January 30, 1988, at his home (1419 Cambridge Drive, Champaign, Illinois). He was born on March 19, 1924, and received his bachelor's and master's degrees from the University of Minnesota. Gary was an associate professor in the Department of Animal Sciences at the University of Illinois for 33 years, working with the Dairy Herd Improvement (DHI) program as a dairy Extension specialist. A Navy veteran of World War II, he served from 1943 to 1946. Gary received national DHI and College of Agriculture awards in recognition of his work and programs. Survivors include his wife, four children, and six grandchildren. Memorials may be given to the G.W. Harpestad Scholarship Fund.

Economics of Feeding Fat

Feeding supplemented fat to high-producing dairy cows continues to be discussed and tried. A big question is: if the economics are favorable, will response cover the higher feed costs? Added fat can vary from $.13 (soybeans) to $.20 (animal fat) to $.40 (commercial fat sources) per cow per day. Three aspects should be evaluated: increase in milk yield (on a fat-corrected basis), improvement in reproductive performance (few days open), and/or less metabolic stress and disorders (ketosis and body condition scores). Table 1 illustrates one method to calculate cost-to-benefit ratios.

Table 1. Estimated return from feeding fat to early lactation cows (Davis, 1988)

	Response in milking yield	
	5 percent	10 percent
Extra milk	$103	$189
Breeding value	$ 70	$ 70
Total value	$173	$259
Fat costs	$ 65	$ 65
Benefit:cost ratio	2.7:1	4:1

The assumptions were that cows produced 75 pounds of milk and received added fat, milk was $12 per 100 pounds, cows rebred 20 days earlier, supplemented fat was fed from 21 to 150 days postpartum, and added fat costs were $.45 per day fed. Targeting high-producing cows that will respond and feeding fat only to cows in early lactation will be key management factors. Dairy producers will need to monitor economics of their own situations.--*M.F. Hutjens, Extension Dairy Specialist*

By-Product Feed Price Update

By-product feed prices continue to shift due to foreign sales, strength of the U.S. dollar, availability, and storage costs. Prices quoted in Table 2 reflect field prices reported by dairy producers or commodity brokers. Breakeven prices were based on $2 per bushel ($72 per ton) shelled corn and $220 per ton soybean meal. If a by-product feed

can be purchased for less than the breakeven price, it is a good buy as a source of energy (based on shelled corn) and protein (based on soybean meal). Dairy farmers should monitor by-product feeds for quality and nutrient variation.--*M.F. Hutjens, Extension Dairy Specialist*

Table 2. Economic Comparisons of By-product Feeds

	Break-even prices	Field prices
	----------$/ton----------	
Whole cottonseed	135	170 to 230
Soybeans	200	208
Corn distillers grain	126	130
Dried corn gluten feed	135	120
Corn gluten feed (40 percent DM)	67	65
Soy hulls	85	90
Dried brewers grain	123	120
Wet brewers grain (30 percent DM)	41	30
Beet pulp	68	240

Computer Dairy Ration Workshop

A one-day workshop has been scheduled for April 12, 1988, at the University of Illinois Veterinary Computer Lab. If you are interested, call (217)333-2928 or write the Dairy Extension office, 315 Animal Sciences Laboratory, 1207 W. Gregory Drive, Urbana, Illinois 61801. Enrollment is limited to 12 farms or agri-business units due to available computers. Each unit will receive hands-on training on the latest version of the Illinois Dairy Ration Analyzer software (over 200 copies are currently being used) with a 60-page user manual. The registration fee is $35 per farm or unit. The program starts at 9 a.m. on April 12 and continues until the user understands and can run the IBM-compatible program. Dave McQueen and Mike Hutjens will team-teach the workshop. Pre-enrollment is a must because materials and diskettes will be sent out prior to the workshop. A minimum of five farms or units are needed to hold the workshop.--*M.F. Hutjens, Extension Dairy Specialist*

Beef Checkoff Referendum

All dairy producers are eligible to vote on May 10, 1988, to determine if the $1 per head fee for cattle marketed will continue. The checkoff funds are used to promote beef consumption and conduct product research to expand markets for beef. The beef promotion program is patterned after the highly successful milk promotion program (increased sales of 9 percent in the last three years). Voting will be held at local Extension offices. Applications for absentee ballots can be made by signing postage-paid cards available from the Beef Extension office at 110 Stock Pavilion, 1402 W. Pennsylvania Avenue, Urbana, Illinois 61801 or other Extension offices. An eligible voter is any individual who has owned cattle between October 1, 1986, and May 10, 1988 (this includes 4-H and FFA members). Dairy producers will be represented on the national promotion board. Be sure to vote your choice on May 10.--*M.F. Hutjens, Extension Dairy Specialist*

Coccidiosis Control in Calves

Coccidiosis is a parasitic disease caused by a one-celled protozoan called coccidium. It affects the lining of young cattles' intestines (inflammation) resulting in reduced feed efficiency and growth rates. Symptoms include diarrhea, blood or mucus in the manure, rough hair coat, poor performance, and reduced feed intake. These signs are not apparent until halfway through the microorganism's life cycle. Less than 5 percent of affected cattle show clinical signs of the disease. The economic loss is estimated to be $38 per calf through delayed growth, treatment costs, and higher feed costs. A five-point program is outlined.

1. Check calves and heifers for symptoms.
2. Run a confirmation test through a local veterinarian.
3. Develop a control program with your veterinarian.
4. Implement a preventive program using ionophores (lasalocid or monensin) or coccidiostats (decoquinate) in calf starters and grower grain mixtures.
5. Maintain good sanitation and isolate sick animals.

A preventive program is recommended on a routine basis on Illinois dairy farms.--*M.F. Hutjens, Extension Dairy Specialist*

Research Update

Several articles in recent issues of the *Journal of Dairy Science* and the *Journal of Animal Science* are summarized below. Copies of the complete research report are available from our Extension office (315 Animal Sciences Laboratory, 1207 W. Gregory Dr., Urbana, Illinois 61801) or the author at the listed university.--*M.F. Hutjens, Extension Dairy Specialist*

Hair Analysis and Mineral Status

Many problems make interpretation of mineral results derived from hair analysis difficult. External mineral

sources (manure, sweat, or dust) can be incorporated into hair and the analysis. Minerals incorporated within the follicle may reflect mineral status at the time that the hair filament was synthesized. However, hair growth is cyclic, not a continuous process, and mineral deposition on hair does not cease when the follicle is not producing hair fiber. For several elements (magnesium, copper, zinc, and selenium), correlations exist between hair mineral concentrations and mineral intake; but correlations are low. Sex, age, hair color, sire, body location, and contamination affect mineral levels in hair. Calcium, phosphorus, and iron intakes affect uptake of other elements in hair. *Research application*: Because many factors cause variation in mineral content in hair, hair analyses are not precise indicators of mineral status.--*D.K. Combs, University of Wisconsin, Madison* (Journal of Animal Science *65:1753)*

Multiple Infusions for Treating Mastitis

Efficacy of multiple and single intramammary infusions of benzathine cloxacillin (500 mg per quarter) were compared for treatment of mastitis during the dry period. Three infusion treatments (3X) occurred at 0, 7, and 14 days into the dry period compared to one infusion treatment (1X) at drying off, and a control of no treatment. Results are summarized in Table 3.

Table 3. Effects of Various Dry Treatment Strategies

	Control	1X	3X
Somatic cell count (10^5)	3.10	3.87	4.02
Infected quarters per cow (number)	2.35	1.61	1.21
Incidence of clinical mastitis (number)	14	7	7
Cows showing clinical mastitis (number)	9	5	5
Infections eliminated (percent)	52.8	73.6	75.5

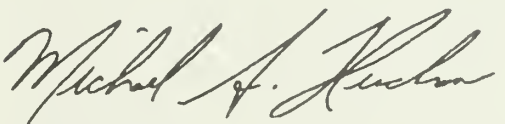
The primary effect of cloxacillin in the dry period was to prevent new streptococcal infections. Sensitivity tests on staphylococcal infections indicated that cloxacillin was still an effective dry cow treatment after seven years of use in the herd. *Research application*: Multiple dry cow treatments with cloxacillin do not offer any advantage over single dry cow treatments.--*K.A. Cummins, Auburn University, Auburn, Alabama* (Journal of Dairy Science *70:2658)*

Selenium Status in Animals

Selenium (Se) concentrations in animal tissue vary with tissue and the amount and form of Se in the diet. Se concentrations rank highest in kidney tissue followed by heart, skeletal muscle, and adipose tissue (lowest). Se concentrations in plasma, serum, or whole blood are related to inorganic Se intake and rise in direct relation to each other in the deficient-to-adequate range. Plasma or serum levels of 0.08 to 0.12 ppm (parts per million) or 80 to 120 ppb (parts per billion) reflect adequate dietary blood levels. Whole blood Se is 10 to 50 percent higher than plasma levels due to storage in red blood cells. Se-dependent glutathione peroxidase activity of plasma or whole blood may be used to assess Se status, but lab variation, enzyme specificity, and handling factors must be considered. Urinary Se excretion as a percentage of Se intake may be helpful in assessing Se status when metabolism studies are available. *Research application*: Se is a key mineral that should be supplemented to dairy cattle. Blood analysis is a useful method to monitor the animal's Se status.--*D.E. Ullrey, Michigan State University, East Lansing, Michigan* (Journal of Animal Science *65:1712)*

Measuring Mold in Hay

Near infrared reflectance (NIR) spectroscopy was used to quantify mold by spectrally predicting chitin (a fungal cell wall). Chitin concentrations ranged from 75 to 710 micrograms per gram of hay dry matter (DM). Standard errors of calibration and validation were 44 and 65 micrograms per gram DM. NIR equations used to predict mold (chitin) in bales that had been visually estimated for mold using mold indexes resulted in good agreement. *Research application*: NIR spectroscopy can accurately quantify mold in alfalfa hay quickly and accurately. This information can improve marketing and pricing of hay.--*D.W. Graffis, University of Illinois, Urbana, Illinois* (Journal of Dairy Science *70:2560)*



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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Vol. 17, No. 3 October 1988

IN THIS ISSUE:

1988 Dairy NRC Available

After three years of committee work, the revised 1988 Dairy National Research Council (NRC) bulletin is available. The 158-page booklet can be purchased for $14.95 from the National Academy Press, 2101 Constitution Avenue N.W., Washington D.C. 20418 (Code DAIRY 2). Discounted prices are available for larger orders. Significant changes are listed below.

1. Higher protein requirements are listed for high-producing cows (up to 19 percent in the total ration dry matter (DM)), calf starter (18 percent), and heifer rations (12 to 16 percent). Undegradable and degradable protein amounts are listed (grams per day).
2. Milk cow DM intakes are increased by 5 to 10 percent.
3. Fiber levels are lowered by 2 percentage points for acid detergent and crude fiber.
4. Neutral detergent fiber guides are listed for the first time.
5. Calcium, phosphorus, magnesium, potassium, iodine, selenium, and vitamin E allowances are increased.
6. A specific chlorine requirement is listed instead of a salt requirement.
7. Vitamin E recommendations for cows and growing heifers are listed for the first time.
8. Growing heifer requirements are split into three age groups: 3-to-6 months, 6-to-12 months, and over 12 months of age.
9. Early lactation (first three weeks postpartum) guidelines reflect ration transitional changes from a dry cow to high-producing cow ration, lower DM intake, and weight losses.
10. Five milking cow groups with five different body weights illustrate ration changes and needs.
11. Feed composition tables are expanded to include ether extract, ash, several fiber sources, and micronutrient composition.
12. A new section on "Special Aspects of Dairy Cattle Nutrition" contains valuable information on new concepts, additives, and metabolic disorders.

This publication is a must for dairy farmers, veterinarians, and agri-business personnel wanting the latest information and guidelines for feeding dairy cattle.--*M.F. Hutjens, Extension Dairy Specialist*

1987 Costs to Produce Milk

Total returns exceeded total costs for Illinois dairy producers in 1987, for the first time since 1979, according to figures summarized by University of Illinois agricultural economists in cooperation with the Illinois Farm Business Farm Management Association (FBFM). Individual records tabulated were from farmers enrolled in the FBFM record-keeping and business analysis program.

A detailed breakdown by herd size of 1987 milk production costs and returns for dairy farms is shown in Table 1. Farms included had no other livestock, with all costs accounted for either in crops or in the dairy enterprise. Total costs for the dairy enterprise were reduced by income from sales of dairy animals or from an inventory increase in pounds of beef produced during the year. The value of the added pounds was figured at the average price received for all weights of dairy

Table 1. Costs and Returns for Illinois Dairy Enterprises, by Herd Size, 1987

	40 to 80 cows per herd	More than 80 cows per herd	All units
Number of farms	98	65	163
Average tillable acres per farm	290	469	361
Average number of cows per farm	59.8	108.2	79.1
Average milk per cow, pounds	15,765	16,010	15,863
Average beef produced per cow, pounds	610	600	606
Costs per cow, milk plus beef	$ 2,149	$ 2,129	$ 2,141
Average returns from beef	273	285	278
Net costs for milk per cow	1,876	1,844	1,863
Return from milk per cow	1,904[a]	1,968[a]	1,930[a]
Return above all cost	$ 28	$ 124	$ 67
Cash costs per 100 pounds of milk produced,			
Feed	$ 5.22	$ 5.05	$ 5.15
Operating expenses,			
Maintenance and power	$ 1.24[b]	$ 1.37[b]	$ 1.29[b]
Livestock expense	.94	1.03	.98
Insurance, taxes, and overhead	.27	.21	.25
TOTAL operating expenses	$ 2.45	$ 2.61	$ 2.52
Other costs per 100 pounds of milk produced,			
Depreciation	$ .92[c]	$ .91[c]	$ .92[c]
Labor	1.96	1.57	1.80
Interest charge on all capital	1.35	1.38	1.36
TOTAL other costs	$ 4.23	$ 3.86	$ 4.08
Total nonfeed costs per 100 pounds of milk produced	$ 6.68	$ 6.47	$ 6.60
Total all costs per 100 pounds of milk produced	$ 11.90	$ 11.52	$ 11.75
Net price received per 100 pounds of milk produced	$ 12.08	$ 12.29	$ 12.16
Return above all costs per 100 pounds of milk produced	$ .18	$ .77	$ .41

[a]Agricultural Stabilization and Conservation Service (ACSC) payments for government dairy reduction program were not included.
[b]Includes utilities, machinery, equipment and building repairs, machines hired, and fuel.
[c]Includes machinery, equipment, and building depreciation.

animals sold in the past five years. The residual costs--87 percent of the total enterprise costs--were the net cost of producing milk. The feed cost includes on-the-farm grains evaluated at average Illinois market prices for the year, with corn at $1.61 per bushel and oats at $1.64 per bushel. Commercial feeds were listed at actual cost, hay and silage at farm values, and pasture at $.40 per animal per pasture day.

Herds with more than 80 cows for the first time averaged over 16,000 pounds of milk produced per cow. Milk production per cow for this group has increased by 1,654 pounds, or 12 percent since 1984. Herds with more than 80 cows also produced more milk per cow and did so more cheaply. Compared with herds of 40 to 80 animals, larger herds produced an additional 245 pounds more milk per cow. Total costs for each 100 pounds of milk produced were $.38 lower for the larger herds. Labor costs, which were $.39 less per 100 pounds produced, accounted for most of the difference. For each 100 pounds of milk produced, the large herds also averaged $.17 lower feed costs. The trend in total costs and returns per cow for all herds is given from 1984 to 1987 (Table 2). When cash and noncash costs are figured, the profit margin (return above all cost) increased--from $-57 per cow in 1986 to $67 per cow in 1987.

Higher milk and beef prices, along with lower feed costs were the main reasons 1987 was a profitable year for dairy produc-

Table 2. Costs and Returns per Cow for Illinois Dairy Enterprises, 1984 to 1987

	1984	1985	1986	1987
Number of farms	177	184	180	163
Number of cows	70	69	73	79
Net cost for milk, per cow	$ 2,130	$ 2,022	$ 1,890	$ 1,863
Return from milk, per cow	1,810[a]	1,852	1,833	1,930
Return above all costs, per cow	$ -320	$ -170	$ -57	$ 67
Price received per 100 pounds of milk	$ 12.50	$ 12.28	$ 11.80	$ 12.16
Price received per 100 pounds of beef	$ 43.92	$ 44.23	$ 43.21	$ 51.16
Milk produced per cow, pounds	14,483	15,076	15,541	15,863

[a]ASCS payments for government dairy reduction program were not included.

ers. The average price received per 100 pounds of beef sold was $51.16 in 1987 compared to $43.21 in 1986. This was the highest average price received for beef since 1982. The average net price received per 100 pounds of milk sold was $12.16 in 1987. This is the first year since 1981 that the average price received for milk increased when compared to the average for the previous year. Higher milk production per cow has held returns from milk per cow at stable levels even though the price received for milk has been decreasing during the '80s. Since 1981, the price received for milk has dropped 8 percent while pounds of milk produced per cow has increased 14 percent. Feed costs per 100 pounds of milk produced continued to decline in 1987 and were at their lowest level since 1977. Feed costs were 24 percent below the 1984 feed costs, which was the highest since 1972, when these studies began. In 1987, feed costs made up 44 percent of the total cost to produce milk.

As a result of the drought of 1988, dairy producers can expect profit margins to tighten considerably due to higher feed costs during the second half of the year. Feed costs per 100 pounds of milk produced would average about $7.10 using prices of $2.75 per bushel for corn, $.18 a pound for protein, and $75 a ton for hay. This is based on annual feed consumption per cow, including replacement animals, of 123 bushels of corn, 2,355 pounds of protein, and 7.3 tons of hay or hay equivalents. This increase in feed cost would be $1.95, or 38 percent higher, than the $5.15 average feed cost per 100 pounds of milk produced in 1987. However, the average feed cost for all of 1988 will not increase as much due to only a moderate increase in feed costs during the first half of 1988.--*D. H. Lattz, Extension Farm Management Specialist*

Best Buys On Feeds

The drought has dramatically affected feed prices. With high soybean meal, corn, and hay prices, by-product feeds have become economically attractive in some areas.

Recently, Iowa State University developed a Lotus spreadsheet that calculates breakeven feed prices based on shelled corn (energy source), soybean meal (protein source), and midbloom alfalfa hay (fiber source). This program has the advantage over Morrison constants because it uses net energy-lactation values, current feed composition data, and added value for the fiber component of feedstuffs. The breakeven prices calculated below were based on shelled corn at $100 per ton, soybean meal at $300 per ton, and midbloom alfalfa hay at $100 per ton.

Feed	Breakeven price
	$/ton
Drought-stressed corn silage	$ 24
Government set-aside grass hay	$ 52
Early bloom alfalfa hay	$108
Beet pulp	$77
Brewers' grain, dry	$169
Brewers' grain, wet (24 percent dry matter)	$44
Cottonseed, whole	$167
Distillers' grains	$204
Molasses, cane	$66
Oats	$104
Soybean seed, raw	$268
Wheat middlings	$138
Corn gluten feed	$154
Hominy	$115

If the dairy farmer can purchase and have the feed delivered to the farm at or below the breakeven price, the feed would be a good buy. Nutrient content of these feeds should be considered when substituting feeds and balancing rations.--*M.F. Hutjens, Extension Dairy Specialist*

Checking for Abnormally Fermented Feeds

Normal or desirable fermentation of wet feeds may be more difficult due to drought stress, variable maturity, and

shifts in moisture content. Pennsylvania specialists summarized points to check if feeds have had a normal fermentation.

1. Abnormally fermented feeds may have elevated levels of some acids, amines, and ammonia.

2. These components *may* reduce feed intake, increase the number of off-feed cows, increase the incidence of ketosis, depress milk production, and lower milk fat test.

3. It is possible that some infectious agents or toxic factors may be present if pH is not low enough.

4. Forage testing procedures will not generally detect abnormal fermentations.

5. Abnormally fermented silage may look and smell normal in some cases. However, the following indications of abnormal fermentation may be present:

   - Vinegar-type odor from a high level of acetic acid
   - Pungent or butyric acid smell (like poorly fermented direct-cut silage)
   - Ammonia smell
   - Hot or warm silage when removed from the silo or rapid heating while mixing and feeding.

6. The poorly fermented silage may be present in only pockets throughout the silo.

7. Little or no fermentation has occurred. Dry corn silage and hay crop silage are likely candidates for this.

8. When green-chopped or poorly fermented corn silage is fed, protein utilization may be reduced. Milk production or fat test may drop unless extra protein is fed.

9. Elevated ADF-N (acid detergent fiber - nitrogen) or ADF values may indicate an abnormal fermentation and heat damage.

10. Moisture levels outside of recommended ranges can increase the potential for an altered fermentation.

11. A pH test on a sample may be useful in determining whether an abnormal fermentation has occurred. Normal pH ranges for ensiled materials are:

Corn silage	3.5 - 4.5
Haylage	4.5 - 5.4
Ensiled grain	4.3 - 5.0

12. A volatile fatty acid and lactic acid analysis may also be useful. However, these are expensive and not widely available.

13. If you suspect a silage fermentation problem, it is advisable to stop feeding the silage or lower the amount fed. An improvement in animal performance may occur in 10 to 14 days.

Health and production problems can be caused by abnormal fermented feeds.--*M.F. Hutjens, Extension Dairy Specialist*

Keeping Up With Research

In recent issues of the *Journal of Dairy Science*, several articles were published, which may be helpful to dairy managers and agri-business personnel. Each article has a contact individual and university listed if more information is needed or questions occur. Copies of the complete journal article are available through the Dairy Extension Office at (217)333-2928.--*M.F. Hutjens, Extension Dairy Specialist*

Use of Latex Teat Dip with Germicide During the Dry Period

The efficacy of an acidic latex barrier teat dip with germicide on new infections at parturition were tested on 113 cows. Two quarters of each cow were dipped once per day for 14 days prior to calving. All quarters received antibiotic therapy at drying off. The number of new infections at calving were 32 in control cows and 36 in teat-dipped cows, with no differences between type of mastitic organisms.

Research conclusion: These results suggest no benefit to use of prepartum latex teat dip with germicide on new infections at parturition. The most effective way appears to be decreased exposure of teat ends to pathogens--*W.L. Crist, University of Kentucky, Lexington*

Effects of Oral Selenium and Vitamin E

Two studies were conducted to evaluate long-term and short-term supplementation with oral selenium (Se) and vitamin E (E). In a two-lactation experiment, 152 cows with low serum Se and E were assigned to one of the following groups: (1) control, (2) 500 IU of E per day, (3) 2 milligrams (mg) Se per day, or (4) 500 IU of E and 2 mg Se per day. Serum levels of Se and E increased within 1 month with maximum serum Se in the first lactation at 67 ng (nanogram) per ml (milliliter) and 74 ng per ml in the second lactation in groups 3 and 4. Serum E levels average 3.0 to 3.3 micrograms (μg) per ml in groups 2 and 4. Colostrum and calf serum E levels were higher in Se groups. No reproductive changes were observed.

In another 8-week study, 24 cows low in Se serum were assigned to diets with 0, 2.5, 5, and 10 mg of supplemental Se. By week 4, serum Se current rations were 23, 56, 71, and 79 ng per ml in the respective groups.

Research conclusion: Adding 2 to 2.5 mg of supplemental Se per cow per day was not adequate for targeted serum Se (70 to 80 ng per ml). The FDA levels of 0.3 parts per million (ppm) added Se should be fed. Supplementation of 500 IU of E maintained serum E in the 2 to 4 μg per ml desirable range. Both additions should improve calf and cow immune systems through higher serum and colostrum Se levels.--*J.W. Thomas, Michigan State University, East Lansing*

Persistence of Residues in Milk Following Antibiotic Treatment

Composite milk samples (122 from 58 cows) receiving antibiotic treatments for any reason were evaluated for drug residues 72 hours after treatment. Sampling continued every 24 hours until negative results were obtained using the *Bacillus stearothermophilus* disc assay. Seven different antibiotics were followed with penicillin and cephapirin being the only sources that exceeded recommended withdrawal times. Research results indicated 21 percent of milk samples were positive for residues beyond the recommended withholding period when administered at normal and higher than label recommendations. Route of administration, cows treated for more than one case, number of days treated, animal body weight, lactation number, and daily milk production did not affect drug persistency.

Research conclusion: Antibiotic residues may be present in milk at the end of the recommended withdrawal time when therapy is administered. Milk of treated cows should be monitored before it is added to the milk supply. --*G.M. Jones, Virginia PolyTech, Blacksburg*

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Vol. 17 , No. 4 December 1988

IN THIS ISSUE:

1989 Illinois Dairy Days

Sound management information, ready to be taken home and put to work, will be the premium for those attending the **1989 Illinois Dairy Days** January 9 through 20 around the state.

The theme of the meetings is "Optimizing on Opportunities," and each meeting will feature advice from specialists on heifer feeding, housing, and economic strategies. Extension is sponsoring the meetings along with the University of Illinois Department of Animal Sciences and the Illinois Department of Energy and Natural Resources.

The dairy industry continues to face challenging times. With profit margins tightening and drought-related problems, dairy producers need practical approaches to help them deal with those challenges.

Each program opens at 10:15 a.m. with registration. Mike Hutjens is the first speaker, at 10:30 a.m., on the topic of "A Three-Phase Heifer Feeding Approach." Time is set aside at 11:30 a.m. for a Dutch treat lunch and, in some locations, viewing of commercial displays. "Management Considerations in Heifer Housing" will be the topic of a 1:00 p.m. presentation by either Ted Funk or Tad Kerr, both University of Illinois agricultural engineers. At 1:45 p.m., Stan Smith, an area Extension dairy adviser, will present "Economic Management Alternatives." Questions and discussion are scheduled for 2:30 p.m. A $3 registration fee will cover the price of the *1989 Illinois Dairy Report* and cost of each farm unit represented.

Dates and locations are:

January 9 -- Pekin, Agricultural Center

January 10 -- Sterling, Emerald Hill Country Club*

January 11 -- Freeport, Masonic Temple*

January 11 -- Elizabeth, Community Building (the order of speakers will be reversed at this meeting)

January 12 -- Marengo, Cloven Hoof Restaurant

January 13 -- Kankakee, Redwood Inn

January 17 -- Quincy, Farm Bureau Building*

January 18 -- St. Libory, American Legion Hall*

January 19 -- Breese, American Legion Hall*

January 20 -- Teutopolis, Knights of Columbus Hall*

*Commercial exhibits will be on display.

Bring a neighbor or co-worker and plan to attend the **1989 Illinois Dairy Days**.--*M.F. Hutjens, Extension Dairy Specialist*

New Feed Bulletin Available

"Feeding The Dairy Herd," Illinois Circular M-1183, first appeared in Illinois in 1980 with over 4,000 copies

distributed. A revised edition of this complete dairy bulletin is available as a joint effort of dairy nutritionists from Illinois, Iowa, Minnesota, and Wisconsin. The 45-page circular contains feeding information and guidelines, plus several new items:

- 1988 Dairy NRC tables
- New formulas to predict economic feed values
- Updated feed additives, metabolic disorders, and feed delivery system sections

This circular is a must for dairy farmers, veterinarians, and feed company personnel. The new version will be sent to *Illinois-Iowa Handbook* subscribers. Copies can also be purchased for $3.25 from Agricultural Publications 54 Mumford Hall, 1301 Gregory Drive, Urbana, IL 61801 *--M.F. Hutjens, Extension Dairy Specialist*

Interpreting Drought-Stressed Corn Silage Tests

Drought-stressed corn silage test results have been unusual. Some samples are high in acid detergent fiber (ADF) ranging from 28 to 32 percent. This corn silage contains 10 to 15 percent less energy at 0.60 to 0.65 megacalories (Mcal) per pound of dry matter (DM). A second group of corn silage tests, ranging from 15 to 20 percent ADF, contains 0.75 to 0.83 Mcal per pound of DM. Normal corn silage contains 22 to 26 percent ADF, with 0.68 to 0.70 Mcal per pound of DM. Energy content of corn silage is calculated from fiber content.

The high ADF silage will require more energy, and cows may not consume as much silage. A lack of corn in the silage could explain these results. The low ADF silage can result in rations low in fiber (lower fat tests and off feed). Stressed corn (short with thin stalks and some corn) or corn plants that never matured (grasslike) could explain these results. Researchers are hesitant to use the high-energy values of 0.80 Mcal. Farmers should test silage, adjust rations, and monitor cow performance.*--M.F. Hutjens, Extension Dairy Specialist*

Aflatoxin-Contaminated Corn Update

Drought conditions have made corn more susceptible to aflatoxin formation. Approximately 1 percent of aflatoxin in feed can be transferred to milk. Milk containing 0.5 ppb (parts per billion) or more cannot be marketed. Lactating cows and calves should not consume feed containing more than 20 ppb; dry cows and bred heifers, no more than 100 ppb; and open heifers over six months of age, no more than 200 ppb.

Visual inspection of corn is not a reliable method, because most toxin-producing molds are not visible under field conditions. Mold culture can identify mold types but does not determine the level of toxin present. Fluorescence results when damaged corn is exposed to long-wave ultraviolet light (356 to 366 millimicrons) or black light, and glows. Aflatoxin-producing mold produces kojic acid which gives a greenish yellow glow. Crack each kernel into four pieces prior to evaluation. Total weight of samples should be about 0.5 pounds. Old corn (1987 crop) may not glow with aflatoxin damage because of age (acid breaks down).

Enzyme immunoassays are quick (card) tests that are commercially available. Test solutions have a short shelf life and need refrigeration. These tests check for positive results at 20 ppb and cost $10 to $15. Minicolumn and chromatography tests must be run in laboratories with skilled technicians. The cost of these tests varies from $20 to $50.

An incomplete list of Illinois labs that perform mycotoxin analysis includes: Contech Pet, Inc., Greenville; Corn Belt Biochemical, Inc., Bloomington; State Diagnostic Laboratory, Centralia; and University Veterinary Diagnostic Laboratory, Urbana. Cost and sample size vary among labs.*--M.F. Hutjens, Dairy Specialist*

Checking If Silage Can Be Moved

Dairy producers may want to move silage from a silo, a bag, or a bunker silo to another silo for ease of feeding or use of mechanical feed delivery systems. Another situation could be when silage is purchased and must be transported and stored in another silo. Georgia researchers provide the following method for evaluating if heating will occur after moving silage.

- Start with one bushel of silage.
- Spread it out in a warm place.
- Mix occasionally to ensure air exposure.
- At the end of 12 hours, it should be cool to the touch.
- If it is warm, storage problems can be anticipated.

Move silage as quickly as possible with a minimum of air infiltration. Packing minimizes air exposure. Wetter, well-fermented silage low in pH can be moved more successfully. Transferring forage during cold weather keeps silage temperatures low. Heating causes DM losses, mold formation, and lowered feed palatability.*--M.F. Hutjens, Extension Dairy Specialist*

Time to Renew Subscription

Your 1988 *Dairy Digest* newsletter subscription will expire with this issue. We encourage you to re-subscribe today. If you have topics you would like to see in the newsletters, let us know: Dairy Extension Office, 319 Mumford Hall, 1301 West Gregory Drive, Urbana, IL 61801.

Keeping Up with Research

In the October issue of the *Journal of Dairy Science*, several articles were published that may be helpful to dairy managers and agri-business personnel. Each article has a contact individual and university listed if more information is needed. Copies of the complete journal articles are available through the Dairy Extension Office at (217) 333-2928.--*M.F. Hutjens, Extension Dairy Specialist*

Effects of Early or Late Breeding of Heifers

One group of heifers (253) was bred at first estrus after 350 days of age. A second group (249) was bred after reaching 462 days of age. Feeding and management were identical. Although the older heifers had slightly higher first lactation yields, these advantages did not carry over to second or third lactations (Table 1).

Table 1. Milk Production and Growth Comparisons for Young and Older Bred Heifers

	Young (350 days)	Older (462 days)
Milk yield, second lactation (lb)	10,452	10,549
Milk yield, third lactation (lb)	13,556	13,554
Body weight (lb)	1,312	1,340
Withers height (cm)	131.8	132.7

No significant differences in size, reproduction problems, or health problems were noted. A reduction of one month of age at first calving increased total milk at 61 months by 1,218 pounds of milk.

Research conclusion: Early breeding is a viable and practical method to improve profitability for the dairy industry.--*A. J. McAllister, Ontario Research Center, Canada*

Feeding Oil Seeds to Dairy Cows

Eight rumen-cannulated Holstein cows were used to study milk composition when whole soybeans or cottonseed were fed. Whole seed, roasted seed, and free oil were compared to oil meal control diets (Table 2).

Table 2. Milk Yield, Composition, and Feed Intake Comparisons of Soybean or Cottonseed Feeds

	Control	Oil	Whole seed	Roasted seed
Soybeans				
Milk (lb)	53.7	48.2	53.0	55.4
Fat (%)	3.53	2.75	3.59	3.59
Protein (%)	3.45	3.27	3.28	3.21
Intake (lb)	50.8	44.9	46.0	46.0
Cottonseed				
Milk (lb)	59.4	56.1	56.8	57.9
Fat (%)	3.54	2.99	3.70	3.56
Protein (%)	3.03	3.15	3.11	3.07
Intake (lb)	50.6	47.1	47.1	45.5

Milk yield was not affected by diet, but milk fat percent was reduced with additional free oil. Milk protein was lowered by feeding soy products with oil, but not cottonseed. Feed intake was reduced with the inclusion of oil or whole seed. Free oil diets also reduced feed digestion and protozoa numbers.

Research conclusions: Processing of oil seeds can affect milk composition, yield, and feed intake. Oil seeds must be managed carefully to get optimal response.--*L.D. Satter, University of Wisconsin, Madison*

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Vol. 18, No. 1 February 1989

IN THIS ISSUE:

Four-State Dairy Seminars Set

"Milking for Quality and Profit" will be the theme for 1989. The program features the latest research and recommendations on milking procedures, milk quality, and mastitis control. Speakers will present a variety of fast-moving and fact-filled topics:

- Dr. Bob Appleman, University of Minnesota, Milking Systems
- Dr. Allan Bringe, University of Wisconsin, Milking Techniques
- Dr. Leo Timms, Iowa State University, Milk Quality Tests
- Dr. Dave McQueen, University of Illinois, Mastitis Control

Meetings are scheduled for March 7, Arlington, Wisconsin; March 8, Freeport, Illinois (Highland Community College Auditorium); March 9, Calmar, Iowa; and March 10, St. Paul, Minnesota. A preregistration fee of $15 (includes lunch, program, and a proceedings) is required. This program is a must for veterinarians, milk sanitarians, agribusiness personnel, and interested dairy producers. A flyer with details is available from the Dairy Extension Office or Stephenson County Extension Office.--*M. F. Hutjens, Extension Dairy Specialist*

Nitrate Levels in Forages

Midwest Technical Services, a forage-testing lab in northern Illinois, summarized their forage-testing results from July through December, 1988 (Table 1 and Table 2). Several important conclusions can be made. Nitrate levels in most drought-stressed forages were moderately high. Testing of drought-stressed forages is warranted, but if nitrate toxicity problems exist, they should not be a problem if managed correctly. Nutrient concentration is variable and can result in ration-balancing errors if "book values" are used. Dairy producers should routinely test forages to avoid overfeeding or underfeeding errors.--*M.F. Hutjens, Extension Dairy Specialist*

New Publications Available

The *1989 Illinois Dairy Report* (distributed at **1989 Illinois Dairy Days**) is available for $5 ($3 plus postage charges). The 81-page booklet contains 15 research reports and 3 Extension

Table 1. Nitrate Levels in Forages

Crop	Number of samples	Dry matter (percent)	Nitrate level (ppm)
Corn silage	294	35.0	4,524
Alfalfa hay	46	82.3	5,404
Sudax	10	30.0	4,390
Haylage	13	52.4	3,378
Government-released hay crop	4	88.6	5,586
Small grain	13	74.1	4,848

Table 2. Variation in Corn Silage Crop

Nutrient	Average	Maximum	Minimum	Standard deviation
Dry matter	33.4	64.6	16.2	8.2
Crude protein	9.7	14.0	7.3	1.3
Acid detergent fiber	30.0	40.4	17.1	4.2
Neutral detergent fiber	53.1	63.9	37.0	5.0
Calcium	0.32	0.46	0.16	0.16
Phosphorus	0.32	0.41	0.28	0.12

summaries presented at the 10 Illinois Area Dairy Days. Topics include heifer feeding, heifer housing, economic alternatives, feeding fat, small grain and annual grass forages, alfalfa cubes, mastitis, culling, zinc methionine, artificial intelligence, peroxide-treated straw, reproduction, and health topics.

New Dairy Technologies is a national publication with 11 guidesheets on bovine somatotropin. Topics include feeding, management, consumer concerns, milk marketing, and health aspects of this emerging technology. A complete set of materials costs $5 including postage and handling.

Both publications are available through the Dairy Extension Office, 323 Mumford Hall, 1301 West Gregory Drive, Urbana, Illinois 61801. Make checks payable to the University of Illinois.--*M.F. Hutjens, Extension Dairy Specialist*

Get Ready for the Animal Model

We are about to enter a new era with our genetic evaluations for production traits in dairy cattle. New evaluation procedures for production traits have been developed and will be implemented July 1989. Production proofs are calculated twice each year by USDA. Our present procedures are effective enough; in fact, we're the envy of the world for the progress we've made in genetics over the past 20 years using our present procedures. But now that we have bigger and more powerful computers than ever, we are able to compute genetic measures that are even more accurate.

The Animal Model

The new genetic evaluation procedures will go by the name of Animal Model. You may recall that our current procedures are called the Modified Contemporary Comparison (MCC) procedures. The purpose of this article is to introduce you to some of the new features of the Animal Model.

Genetic evaluations will be more accurate

The Animal Model differs from the MCC procedures, in that bulls and cows will be evaluated at the same time. With the MCC procedures, bulls were evaluated first, and then cows were evaluated using the new bull information. An additional benefit from evaluating all animals simultaneously is that it is relatively easy to account for all known relationships among male and female relatives. Aunts, uncles, grandnephews, great granddaughters, etc., all contribute to the genetic evaluation in proportion to their relationship to any particular individual. This differs from the MCC procedures, which do not always include information on all relatives. For example, *Cow Indexes* do not include any information on descendants under the MCC system. Because all these relationships will contribute to some degree to an animal's genetic evaluation with the Animal Model, the proofs on cows and bulls will almost certainly be more accurate for all animals. There is simply more information included in the new kind of evaluations.

What about cow families?

A common complaint about the MCC procedures was that milking daughters of a particular cow did not contribute to that cow's proof. However, as mentioned above, all known relatives, both male and female, contribute toward an animal's proof with the Animal Model. Cow families are completely accounted for using the Animal Model.

Taking into account the genetic merit of mates

The MCC procedures made the assumption that all bulls were mated to a random group of cows of equal genetic merit. Although this was a fairly safe assumption in most cases, there may be occasions whereby a bull is mated to either below-average genetic merit cows, or above-average genetic merit cows. For example, a bull with an extremely high semen price may have been mated to cows that were above-average for

genetic merit. The Animal Model will take into consideration the genetic merit of a bull's mates, so that even if a bull was mated to inferior, or superior, genetic merit cows, the bull's proof will have accounted for this. Likewise, the sires of a cow's daughters will be taken into account when calculating genetic measures on cows. Recall that daughters will now contribute to a cow's proof with the Animal Model.

So that's an introduction to a few of the features of the Animal Model. Subsequent articles will discuss some of the additional changes that you will notice when the Animal Model is implemented next year. The people who will benefit the most from these new procedures are the dairy farmers, as they will have access to the most accurate genetic measures ever. The Animal Model...it will be here soon!--*D.A. Funk, University of Wisconsin Dairy Specialist*

Evaluating Feed Prices

As winter draws to a close, feed prices and availability are variable across Illinois. The results in Table 3 were calculated from a Lotus spreadsheet by Iowa State University. Base feeds and prices were protein, soybean meal (44 percent), $280 per ton; energy, shelled corn, $92.50 per ton ($2.60 per bushel); and fiber, alfalfa hay (16 percent protein), $120 per ton. If a producer can purchase a feed for less than the break even price, it is a good buy compared to the base feeds. However, dairy cows need a minimum level of forage (such as hay or silage) that cannot be totally replaced with grain sources such as soy hulls or wheat midds.--*M.F. Hutjens, Extension Dairy Specialist*

Why Cows Leave Home

The typical culling rate of Illinois cows enrolled in Dairy Herd Improvement (DHI) is 32 to 35 percent. There are two main types of culling: (l) cows removed by dairy manager (voluntary), or (2) cows that eliminate themselves (involuntary). Ideally, half of cows culled should be voluntarily culled, especially for low production. The Mid-State DHI Computer Lab summarized why cows were culled (Table 4) and the effect of lactation number and involuntary culling on production level of cows removed (Table 5).

EPA (estimated producing ability) indicates the milk-producing ability of a cow compared to other cows (herdmates) in the herd. Positive values indicate that superior cows were culled.

The Mid-States' DHI data indicate voluntary culling is low, especially when only 26 percent were reduced for low production. Reproduction and mastitis continue to be major factors in forcing cows to be removed. As lactation number increases, superior cows are removed, reflecting the importance of longevity and sound management. Current estimates to raise a replacement heifer from birth to 24 months of age is $1,176 while cull cows are marketed for $600.--*M.F. Hutjens, Extension Dairy Specialist*

Topdress Protein Recommendations Available

Protein topdressing recommendations have been the most frequently requested item of information from Dairy Herd

Table 3. Break-even Prices ($ per ton) for Feeds Delivered to the Farm

Alfalfa hay (22 percent protein)	148
Alfalfa hay (14 percent protein)	110
Oat hay (dough stage)	82
Corn silage (33 percent dry matter)	34
Beet pulp (dry)	90
Brewers grain (dry)	169
Brewers grain (24 percent dry matter, wet)	45
Whole cottonseed	180
Cottonseed meal	266
Oats	105
Raw soybeans	249
Wheat midds	137
Soy hulls	99
Corn gluten feed	143
Corn gluten meal	362
Distillers grain	195
Linseed meal	230

Table 4. Culling Summary of DHI Cows in 1988

Type	Percent	Lifetime EPA pounds of milk
Involuntary		
Reproduction	19.0	+246
Mastitis	12.7	+128
Injury	12.1	+ 6
Died	4.1	+356
Ketosis	0.9	- 51
Voluntary		
Low production	26.0	-868
Dairy purposes	12.9	-101
Unknown	12.5	- 34

Table 5. Effect of Lactation Number and Culling on Milk Yield Potential of Cows Removed

Type	Lactation Number 1st	2nd	3rd	4th
	EPA (lb milk)			
Reproduction	-215	+ 82	+402	+ 780
Mastitis	-565	- 81	+292	+ 728
Died	-263	+276	+688	+1,029
Injury	-600	-154	+231	+ 738

Improvement Association (DHIA) records during the past five years. This figure is now available as an added cost option of $1 per herd on Flexible Management Reports (FMR).

Grain/Topdress Needed (FMR 406) is the primary code of interest, although new users may want *Grain/Topdress Kind Codes* (FMR 407) the first few times they request topdressing, just to be sure that the recommendations are based on the desired energy and protein feedstuffs. The information provided under the *Grain/Topdress Needed* column on the FMR is actually two items of information. For example, the values reported for a particular cow might be +18/4.7, which means that this cow needs 18 pounds of grain and 4.7 pounds of protein topdress. The computer, when possible, uses the energy and protein feedstuffs that you report. If the computer cannot identify an energy feedstuff, it uses dry shelled corn instead--if it cannot identify a protein topdress (over 30 percent protein), then it uses 44 percent soybean meal. The plus sign (+) indicates that the cow should not be fed higher amounts of concentrates, because the total amount of grain and protein topdress are at 60 percent of the estimated dry matter intake. Because this amount of grain and protein topdress is not sufficient to provide the cow's energy needs, expect the cow to lose some body weight. The recommendation will provide her protein needs. *Expected Daily Body Weight Loss* (available on FMR 412) will indicate how much body weight the cow would lose (pounds per day). If you have computer feeders or routinely topdress protein in the barn or milking parlor, invest a dollar to get the grain and topdressing recommendations on the FMR. A complete listing of information available on the FMR is available from your DHIA supervisor. A total of eight items can be listed per report.--*L. H. Kilmer, Iowa State University, Extension Dairy Specialist*

Effects of Somatic Cell Count on Milk Yield

The October 1988 herds enrolled in the Mid-States' DHI-SCC (somatic cell count) programs are summarized in Table 6.

Nearly one-third of the herds averaged less than 199,000 SCC, which means excellent quality milk and extra income for quality premium bonuses. Milk yield decreases 1.3 to 2.3 pounds *per day per cow*; herd SCC increases 200,000, with a shift of nearly 3,000 pounds less milk per cow *annually*, or $360 lower income.--*M.F. Hutjens, Extension Dairy Specialist*

Table 6. Effects of Herd SCC Level on Milk Production

SCC LEVEL per 1,000	Total herds, (number)	Cows (average number)	SCC level, 1,000	Daily milk (pound)	Annual milk (pound)
0 - 199	922	62	148	45.9	17,093
200 - 399	1,539	70	287	44.6	16,498
400 - 599	632	70	481	42.3	15,603
600 - 799	200	67	684	40.2	14,973
800 - 999	75	59	886	38.0	14,386
> 999	36	59	1,199	36.9	14,266

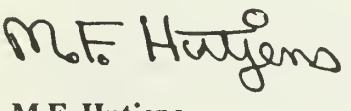
Table 7. DHIA Scorecard - Illinois - Holstein - November 1988

Group	1	2	3	4
1. Production range	<13,700	13,701-15,700	15,701-17,500	>17,500
2. Number herds	148	275	403	303
3. Milk pounds - RHA	12,668	15,138	16,958	19,201
4. Fat pounds - RHA	467	555	613	690
5. Pounds milk - daily	41.1	47.6	52.5	58.3
6. Days in milk	175	172	174	172
7. Summit - all	56.9	65.1	71.4	78.7
* 8. 1st lactation percent summit	78.5	76.1	75.7	75.1
9. percent in milk	83.8	86.2	87.0	87.6
10. Dry days	70	66	65	62
*11. Percent <40 and >70 days dry	59.4	48.6	37.8	31.6
12. Days to first bred (Pg)	95	89	88	88
*13. Days open (Pg)	136	125	126	122
14. Pounds concentrate fed	5,599	5,934	6,286	6,894
15. I/FC/cow/year ($)	810	1,065	1,218	1,426
*16. Cows to earn $75,000 I/FC	92	70	61	52
17. FC/Cwt. of milk ($)	4.95	4.38	4.26	3.98
18. Percent I.D. by sire	29	50	71	83
*19. Percent from proven sires (cows)	21.8	37.7	62.7	76.5
20. P.D. $ - first lactation	+49	+64	+69	+80
21. P.D. $ - services sires	+54	+73	+92	+99
22. Age of first calving	2-04	2-04	2-04	2-03
23. Age of producing animals	4-04	4-02	4-01	4-00
*24. Percent first lactation	29.1	31.1	32.8	33.8
*25. Prod. females: replacement ratio	1:.78	1:.90	1:.99	1:.99

*Must be calculated

1988 DHI Holstein Scorecard

Illinois Holstein herds on test in 1988 were split into four production groups. A total of 25 different values were summarized or calculated, Table 7. Dairy managers, veterinarians, and agribusiness personnel can compare their herd values to these guidelines to identify weak areas or production trends in the herds. One approach is to circle the values on the table to see if a herd "fits" the normal profile. Similar breakdowns are available for all other breeds through the Dairy Extension office.--*M.F. Hutjens, Extension Dairy Specialist*



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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

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IN THIS ISSUE

Dewayne Dill Joins Dairy Extension Team

Dr. Dewayne Dill joined the Department of Animal Sciences Extension team on February 21 as an Extension dairy specialist. His areas of responsibility and interests will include computer and management systems, dairy herd improvement (DHI) record utilization, genetics, milking management, and youth.

Dewayne grew up near Tremont, Illinois; he received his bachelor's, master's, and doctorate degrees at the University of Illinois, where he was a Bronze Tablet Scholar and a member of the 1981 Illinois dairy judging team (ranked third nationally). While a student at Illinois, he was active in the Illinois Dairy Club and spent a summer on a Stephenson County dairy farm as a student intern. In graduate school, he developed several dairy computer programs, three of which have been marketed commercially. His doctoral research created an artificial intelligence program for pricing registered Holstein cattle.

Dewayne resides in Champaign with his wife, LaRae, and two children, Meg and Benjamin. His office address is 326 Mumford Hall, 1301 West Gregory Drive, Urbana, IL 61801, and his phone number is (217) 333-3408. We are pleased to have Dr. Dill on the Illinois Extension team and the Animal Sciences faculty.--*M.F. Hutjens, Extension Dairy Specialist*

Illinois Heifer Hustle Program

Replacement heifers are a major financial investment on Illinois dairy farms. Each animal may be worth nearly $1,200 at two years of age. Healthy, well-grown heifers allow for strategic culling, genetic improvement, expansion, or added income from sales. To evaluate the status of Illinois heifer-rearing programs, groups of heifers in four to six dairy herds will be measured in each of nine Illinois counties (Jo Daviess, Stephenson, Boone, Carroll, Whiteside, Bond, Clinton, Washington, and Effingham) through the leadership of the county extension advisers.

A three-phase, two-year program has been developed.

- Phase One: Four to six heifers will be measured (wither height, body weight, and body condition scores) in six different age groups (4, 8, 12, 16, 20, and 24 months). These animals will be plotted and compared to the Pennsylvania growth curves to evaluate areas for improvement and change. A growth curve will be plotted for each farm. A three-page management survey will be conducted to evaluate heifer-growing practices and feeding programs on each farm.

- Phase Two: The initial group of 4-month-old heifers will be measured for the next 20 months, with measurements made every 4 months. This phase will allow each heifer to develop her unique growth curve. DHI production records will be monitored after these heifers calve and complete a lactation.

- Phase Three: First lactation heifers will be measured at freshening. When these cows freshen the second time, measurements will be made again to evaluate growth changes. DHI milk yields will be correlated to growth patterns to determine the effects of size and growth during the first lactation.

The Illinois Heifer Hustle program began in March. Most Phase One measurements have been completed. The time needed to measure the groups of heifers ranged from two to four hours per farm depending on facilities, available labor, and number of heifers measured. Watch for results as this field demonstration project continues.--*M.F. Hutjens, Extension Dairy Specialist*

Watch for Aflatoxin in Corn

With warmer temperatures and wet, humid weather, levels of aflatoxin in stored corn can increase. Dairy farmers and county advisers report higher levels in 1988 drought-stressed corn (40 to 60 parts per billion). Levels over 20 parts per billion should not be fed to lactating cows because milk cannot exceed 0.5 parts per billion aflatoxin. Testing with ultraviolet light may not be an effective way to screen suspect corn because the reflective compound (kojic acid) disappears over time, but aflatoxin remains. Dairy producers should monitor both new and old corn supplies for aflatoxin, avoid molding and heating stored corn, practice good bunk management, dilute or limit damaged corn, and consider adding hydrated sodium calcium aluminosilicate (brand name Novasil) to tie up aflatoxin.--*M.F. Hutjens, Extension Dairy Specialist*

Legislation on USDA Purchase Price

On April 1, a temporary 50¢ increase in milk support price went into effect as part of the 1988 drought relief package. All of the increase was applied to the purchase price of nonfat dry milk. Legislation recently signed by President Bush required the secretary of agriculture to apply at least 75 percent of the increase toward nonfat dry milk. Furthermore, on July 1, when the temporary increase is removed, this legislation requires at least 75 percent of the decrease to be taken from the purchase price of butter.

On March 31, when establishing the new purchase prices for cheese, butter, and nonfat dry milk, the secretary of agriculture applied 100 percent of the increase to nonfat dry milk, and the secretary is expected in July to apply 100 percent of the decrease to butter. This action sends a clear signal to the dairy industry. The consumer is demanding dairy products lower in fat, and the industry must be more responsive to their demands.--*D.E. Dill, Extension Dairy Specialist*

Decoquinate Approved for Liquid Feed

The Food and Drug Administration has approved the use of decoquinate (Deccox brand name) in the manufacture of liquid feeds for use in prevention of coccidiosis in ruminating calves. The drug is to be used at the rate of 22.7 milligrams per 100 pounds of body weight per day (the same rate as dry feeds). This new approval will provide dairy producers another approach for controlling coccidiosis in young, ruminating calves.--*M.F. Hutjens, Extension Dairy Specialist*

Keeping Up with Research

Several interesting applied research articles are summarized below with general recommendations for practical applications. A contact researcher is listed for further follow-up; or you may contact the Dairy Extension office for a copy of the entire journal article.--*M.F. Hutjens, Extension Dairy Specialist*

Fish Meal As a Protein Source

The diets of 20 Holstein cows were supplemented with a pound of additional protein from fish meal (1.5 pounds) or soybean meal (2.2 pounds). Diets consisted of alfalfa silage (70 percent) at 39 percent dry matter and high-moisture shelled corn. The crude protein content of both rations was 20.1 percent. Research results are summarized in Table 1.

Table 1. Effect of Supplemental Protein on Milk Production and Feed Intake

	Dry matter intake (pounds)	Daily milk yield (pounds)	Milk fat (percent)	Milk protein (percent)
Soybean meal	50.4	79.2	3.29	2.83
Fish meal	51.0	81.6	3.33	2.92

Cows fed fish meal produced 2.9 pounds more 3.5 percent fat-corrected milk. This produces a 20¢ per-cow-per-day increase in income over feed costs.--*G.A. Broderick, University of Wisconsin, Madison*

Practical Application

Fish meal can provide more undegraded protein while still providing a balance of key amino acids. Bypass values of fish meal can vary from 41 to 71 percent.

Response of Cows to Calcium Carbonate

Sixteen Holstein cows were fed calcium carbonate in the form of limestone to evaluate its effect on rumen characteristics and milk components. Two sources of limestone (feed and reagent grade) were used at two proportions of the ration (1.4 and 2.1 percent). Calcium carbonate supplementation decreased dry matter intake and milk yield; it was not effective in altering rumenal pH, fluid dilution rate, volatile fatty acid pattern, or milk composition. These results suggest calcium carbonate has little or no buffering effect in the rumen, regardless of its reactivity rate or particle size. This lack of rumen response to calcium carbonate is probably due to its low solubility in rumen fluid at a pH above 5.5.--*J.H. Clark, University of Illinois, Urbana*

Practical Application

Calcium carbonate is not an effective rumen buffer. Therefore, its use in buffer packs should be considered primarily as a source of calcium in the diet.

Effect of Chemical Drying Agents on Alfalfa Hay

Third-cutting alfalfa hay that is cut at bud stage was treated with a drying agent (a mixture of potassium carbonate, sodium carbonate, and citric acid). Drying rates were 20 percent faster with the drying agent (0.40 versus 0.48 percent moisture per hour). Twenty lactating Holstein cows were fed treated or control hay. Cows fed the treated hay had higher daily milk yields (72.6 pounds) compared with the control cows (71.5 pounds). No differences in milk or feed composition were observed, although the treated hay was slightly higher in protein and lower in fiber. Total dry matter intake was 2.2 pounds higher for the treated hay ration compared with the control ration.--*M.J. Arambel, Utah State University, Logan*

Practical Application

Strategic use of drying agents can improve feed quality and intake, which will support higher milk production. However, you should consider cost and application methods to see if its use will be cost effective.

Segregating Cows to Prevent Mastitis

The effectiveness of segregating cows with *Staphylococcus aureus (S. aureus)* infections was studied over one year. Nine herds were split into five control and four segregated herds. In the segregated herds, there were 3.7 cows with *S. aureus* intramammary infections, while in the control herds there were 4.3 cases per 100 cow months. Mean percentages of cows with *S. aureus* at the beginning and end of the study were 33.7 and 21.5 in segregated herds and 25.3 and 15.0 in control herds. Cows with *S. aureus* infections in all herds were preferentially culled. These differences between groups were not statistically significant. *--L.K. Fox, Washington State University, Pullman*

Practical Application

Segregation may be one effective component of *S. aureus* mastitis control, but will not eliminate infection alone. Culling and milking-time hygiene are also important control components.

Bacterial Counts in Bedding Materials

Bacterial counts of major environmental mastitis pathogens were compared for organic and inorganic bedding materials (for example, chopped straw and sawdust versus limestone and sand). Organic bedding materials contained significantly higher bacterial counts than did inorganic materials. Teat end exposure to gram-negative and coliform bacteria in organic bedding was greatest during the summer.

Practical Application

Use of inorganic bedding materials appears to be most advantageous during the summer, when bacterial populations are greatest in organic bedding.--*J.S. Hogan, Ohio State University, Wooster*

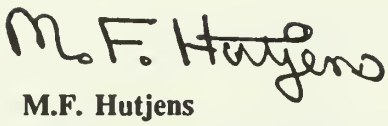
Role of Colostrum Intake on Future Milk Yield

DHI data from large commercial dairy farms were used to evaluate the relationship between first lactation milk yield and passive acquired immunity from colostrum milk. Total serum immunoglobulins (Ig) were measured 24 to 48 hours postpartum for calves allowed to nurse their dams for 24 hours. No attempt was made to ensure adequate intake. Calves were raised, and milk yield was measured in the first lactation. Higher serum Ig concentrations measured after birth were associated with higher first lactation milk

yields. Each additional Ig serum unit resulted in 18.7 pounds more milk per cow.--*D.V. Armstrong, University of Arizona, Tucson*

Practical Application

Supplying an adequate amount of high-quality colostrum after birth to dairy heifers may enhance their future milk production. More research will be needed to support this conclusion.



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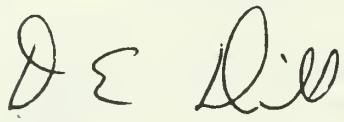

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

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Economic Value of Alternative Feeds

Feed prices this year are lower compared with 1988. With adequate rain in many Illinois counties, corn, hay and soybean meal prices are down. Computer results from the Iowa State Lotus spreadsheet program are listed in Table 1.

Table 1. Break-even Feed Values and Reported Prices in Illinois for Various Feeds

Feed	Break-even value	Field
	--------*dollars/ton*-------	
Beet pulp	97	180
Brewer's grain (dry)	145	130
Brewer's grain (24% D.M.)	38	30
(30% D.M.)	49	40
Ear corn	72	60
Cottonseed, whole	148	170
Cottonseed meal	234	213
Distiller's grain	172	152
Oats	89	75
Soy hulls	88	80
Wheat mids	117	89
Hominy	95	104
Corn gluten feed	128	118
Soybeans, raw	223	200

The energy content value of each feed is based on shelled corn at $82 per ton ($2.30 per bushel); protein value is based on soybean meal (44 percent) at $250 per ton. Field prices are based on semi-load bulk quantities delivered to Champaign, Illinois. Soybean meal is quoted at $225 per ton for bulk semi-load quantities. If a current feed price is below the break-even value, it is a better buy than shelled corn (for energy) and soybean meal (for protein).--*M.F. Hutjens, Extension Dairy Specialist*

Heat Treating Soybeans

Whole soybeans contain 20 percent fat and 40 percent crude protein on a dry matter basis. Currently, soybeans are favorably priced and are raised on many Illinois dairy farms. Heat treating raw beans is recommended to improve protein use (that is, it provides more undegradable protein). Recent Wisconsin research (Table 2) shows the benefits of heat treated soybeans (roasted at 260°F and steeped for 30 minutes) in a forage diet based on alfalfa silage.

Table 2. Lactation Performance of Cows Fed Various Soybean Products

	Soybean meal	Raw soybeans	Heated soybeans
Dry matter intake, lb	51.5	49.1	52.0
Milk yield, lb	76.0	75.3	85.7
Fat, percent	3.4	13.50	3.41
Protein, percent	72.99	2.89	2.85

The increase in milk yield is due to the high intake of undegradable protein. Milkfat test was not affected, and protein test was reduced (which is commonly seen in oilseed diets). Earlier Wisconsin research indicated a greater response with heat treated soybeans in alfalfa based rations compared with mixed corn silage-alfalfa silage rations.

As Table 3 shows, heat treatment methods of soybeans are not equal or consistent.

Table 3. Percent Undegradable Protein in Soybeans (Wisconsin)

Method	Number of Samples	Undegradable protein	
		Average	Percent range
		percent	
Raw	8	25	24-28
Roasted	9	46	32-54
Roasted and steeped	4	65	55-72
Steam flaked	7	41	26-50
Jet sploded	4	43	39-52

A wide range of undegradability (determined from in vitro procedures) indicates variation in heating effectiveness. Extruded soybeans vary from 45 to 70 percent undegradable protein.--*M.F. Hutjens, Extension Dairy Specialist*

Costs to Produce Milk

Higher feed costs resulted in total costs exceeding total returns for Illinois dairy producers in 1988, according to figures summarized by University of Illinois agricultural economists in cooperation with the Illinois Farm Business Farm Management Association. Individual records tabulated were from farmers enrolled in the FBFM record keeping and business analysis program.

A detailed breakdown by herd size of 1988 milk production costs and returns for dairy farms is shown in Table 4. Farms included had no other livestock, and all costs were either for crops or the dairy enterprise. Total costs for the dairy enterprise were reduced by income from sales of dairy animals or from an inventory increase in pounds of beef produced during the year. The value of the added pounds was figured at the average price received for all weights of dairy animals sold in the past five years. The residual costs--87 percent of the total enterprise costs--were the net cost of producing milk. The feed cost includes on-the-farm grains evaluated at average Illinois market prices for the year, with corn at $2.32 and oats at $2.25 per bushel. Commercial feeds were listed at actual cost, hay and silage at farm values, and pasture at 40 cents per animal per pasture day.

Milk production per cow for all herds averaged 16,284 pounds. This is the first time that this average has been over 16,000 pounds. The average was 421 pounds more per cow than in 1987 and 1,801 pounds (12 percent) more than in 1984. Herds with more than 80 cows produced milk slightly more cheaply than herds with 40 to 80 animals. Total costs for each 100 pounds of milk produced were 21 cents lower for the larger herds. Labor costs, which were 31 cents less per 100 pounds produced, accounted for most of the difference. The large herds also received an average of 18 cents more for each 100 pounds of milk sold. The trend in total costs and returns per cow for all herds is given from 1985 to 1988 (Table 5). When cash and noncash costs are figured, the profit margin (return above all cost) decreased--from $67 in 1987 to $–71 per cow in 1988.

Higher feed costs was the major reason that total costs exceeded total returns in 1988. Average feed costs for all herds increased from $5.15 per 100 pounds of milk produced in 1987 to $6.05 in 1988. This was a 17 percent increase and the highest feed cost since 1984. Drought conditions in 1988 increased grain and forage prices, which resulted in the increased feed costs. In 1988, feed costs made up 49 percent of the total cost to produce milk. While feed costs increased, nonfeed costs continued to decrease. Total nonfeed costs of $6.31 per 100 pounds of milk produced were at their lowest level since 1979. Lower interest charges along with declines in machinery and building depreciation have contributed to the lower nonfeed costs. While the average price received per 100 pounds of milk sold declined from $12.16 in 1987 to $11.92 in 1988, higher milk production per cow resulted in increased total returns per cow. Since 1981, the price received for milk has dropped 10 percent, while pounds of milk produced per cow has increased 17 percent. The average price received per 100 pounds of beef sold was $56.44 in 1988 compared with $51.16 in 1987. This was the highest average price received since 1982.

Profit margins for dairy producers in 1989 will again, to a great extent, be determined by summer weather conditions and their effect on feed costs. A reduction in the supply of grain and hay has resulted in higher feed costs for the first six months of 1989 compared with the first six months of 1988. Feed costs per 100 pounds of milk produced would average about $6.25 using prices of $2.40 per bushel for corn, $0.15 a pound for protein supplement, and $75 a ton for hay. This is based on annual feed consumption per cow (including replacement animals) of 120 bushels of corn, 2,200 pounds of protein, and 7.3 tons of hay or hay equivalents. If nonfeed costs per 100 pounds of milk produced averaged $6.30, total costs to produce 100 pounds of milk would be $12.55. The average milk price received for the first 5 months of 1989 has been 6 percent higher than during the same time period in 1988. For Illinois dairy producers to cover the total costs of production during the second half of 1989, milk prices will need to remain above 1988 price levels, and normal weather conditions will be needed to lower grain and hay prices and reduce feed costs.--*Dale H. Lattz, Extension Farm Management Specialist*

Table 4. Costs and Returns for Illinois Dairy Enterprises, by Herd Size, 1988

	40 to 80 cows per herd	More than 80 cows per herd	All units
Number of farms	107	50	157
Average tillable acres per farm	279	480	343
Average number of cows per farm	59.5	108.9	75.2
Average milk per cow, pounds	16,279	16,295	16,284
Average beef produced per cow, pounds	608	597	605
Costs per cow, milk plus beef	$ 2,308	$ 2,286	$ 2,301
Average returns from beef	286	295	289
Net costs for milk per cow	2,022	1,991	2,012
Return from milk per cow	1,931	1,962	1,941
Return above all cost	$ –91	$ –29	$ –71
Cash costs per 100 pounds of milk produced:			
Feed	$ 6.01	$ 6.12	$ 6.05
Operating expenses:			
Maintenance and power[a]	$ 1.20	$ 1.23	$ 1.21
Livestock expense	1.00	1.04	1.02
Insurance, taxes, and overhead	0.28	0.23	0.26
TOTAL operating expenses	$ 2.48	$ 2.50	$ 2.49
Other costs per 100 pounds of milk produced:			
Depreciation[b]	$ 0.81	$ 0.75	$ 0.79
Labor	1.76	1.45	1.66
Interest charge on all capital	1.36	1.39	1.37
TOTAL other costs	$ 3.93	$ 3.59	$ 3.82
Total nonfeed costs per 100 pounds of milk produced	$ 6.41	$ 6.09	$ 6.31
Total all costs per 100 pounds of milk produced	$ 12.42	$ 12.21	$ 12.36
Net price received per 100 pounds of milk produced	$ 11.86	$ 12.04	$ 11.92
Return above all costs per 100 pounds of milk produced	$ –0.56	$ –0.17	$–0.44

[a]Includes utilities, machinery, equipment and building repairs, machines hired, and fuel.
[b]Includes machinery, equipment, and building depreciation.

Table 5. Costs and Returns per Cow for Illinois Dairy Enterprises, 1985 to 1988

	1985	1986	1987	1988
Number of farms	184	180	163	157
Number of cows	69	73	79	75
Net cost for milk, per cow	$2,022	$1,890	$1,863	$2,012
Return from milk, per cow	$1,852	$1,833	$1,930	$1,941
Return above all costs, per cow	$ –170	$ –57	$ 67	$ –71
Price received per 100 pounds of milk	$ 12.28	$ 11.80	$ 12.16	$ 11.92
Price received per 100 pounds of beef	$ 44.23	$ 43.21	$ 51.16	$ 56.44
Milk produced per cow, pounds	15,076	15,541	15,863	16,284

Testing Cows for *Staphylococcus aureus* Mastitis

Staphylococcus aureus is one of the major causes of mastitis infections in dairy cattle. *S. aureus* infections are characterized by chronic high somatic cell counts and subclinical mastitis (clots and flakes are rare). A highly contagious organism, *S. aureus* is generally spread from infected quarter to uninfected quarter at milking time.

ProStaph is a new test offered through the Dairy Herd Improvement Association (DHIA) that detects both clinical and subclinical *S. aureus* infections. The ProStaph test is an ELISA test; and since it measures the presence of *S. aureus*-specific antibodies in milk, it does not require an aseptic sample. Routine, preserved DHI milk samples are used instead. The cost of the test is $5.00 per herd plus $2.75 per sample. Herd charge is waived if more that 40 samples are tested.

The ProStaph test scores the milk sample according to the quantity of antibodies present. The scores and interpretation are as follows:

Ab 3 High antibody level, high agreement with culture, high probability of *S. aureus* infection
Ab 2 Medium antibody level, 25 to 50 percent agreement with culture, suspect, should be rechecked
Ab 1 Low antibodies, negative culture, not *S. aureus*
Ab 0 No antibodies, not *S. aureus*

Cows scored **Ab 2** are suspect cows. They may be true *S. aureus* positive, but do not have sufficient levels of antibody to score **Ab 3**. Reasons for an **Ab 2** score include: (1) animal fresh fewer than 30 days, (2) low daily milk production (less than 30 pounds per day), (3) cow cured of previous *S. aureus* intramammary infection, and (4) other nonintramammary *S. aureus* infection in the cow. Since the animals might be a true *S. aureus* positive, they must be rechecked.

ProStaph is only useful for herds with an *S. aureus* mastitis problem. This would include herds with (1) chronic high somatic cell counts, (2) positive *S. aureus* cultures from the bulk tank, (3) cows with chronic high somatic cell counts, or (4) cows with positive *S. aureus* infections. In general, herds with somatic cell counts greater than 300,000 are prime candidates for this test.

The test can be run on the entire herd or on individual animals. The extent of use should be based on the objectives, economics, and degree of *S. aureus* problem. If the goal is to confirm a *S. aureus* infection in high somatic cell count cows, individual samples should be run. If the goal is to eradicate *S. aureus* from the herd, the entire herd should be run. It is not uncommon for cows to have a somatic cell count well below 300,000 and still have an *S. aureus* infection.

ProStaph should not be considered unless the information will be used in a mastitis control program. The first guideline is to involve a veterinarian. The second guideline is to take action. Table 6 lists the recommended action based on ProStaph score and somatic cell counts.

The most important action that must be taken is to identify infected and uninfected animals and take every precaution to avoid spreading the infection. Infected animals should be visually identified (for example, with a leg band) and milked last. The milking procedure and equipment should be evaluated routinely to identify potential problems. Treatment and culling of infected cows should be done

Table 6. Recommended Action Based on ProStaph Score and Somatic Cell Count

ProStaph	Somatic cell count	*S. aureus*	Recommended action
Ab 3	> 300,000	+	Segregate/isolate, cull
Ab 3	< 300,000	+	Segregate and retest
Ab 2	> 300,000	?+	Segregate and retest
Ab 2	< 300,000	?–	Segregate and retest
Ab 1	> 300,000	–	Culture for other organisms
Ab 1	< 300,000	–	Uninfected
Ab 0	> 300,000	–	Culture for other organisms
Ab 0	< 300,000	–	Uninfected

when economical. The ProStaph test should be used once a year to monitor the success of the *S. aureus* control program.--*Dewayne Dill, Extension Dairy Specialist*

Dairy Outlook for 1990

Several observations can be offered regarding the dairy situation and outlook for 1990.

1. Effects of the 1988 drought are continuing to impact the milk industry, particularly in the upper Midwest where Minnesota and Wisconsin have lagged in milk production in 1989 (Wisconsin production in June 1989 was down 3.1 percent from June 1988).

2. The milk industry is coming closer in 1989 and 1990 to a market oriented price environment (as compared to a price support foundation) than it has been since the late 1970s. For example, the July 1989 Minnesota-Wisconsin Price was $11.76 per hundredweight, $1.41 higher than the current $10.35 support price; and 40-pound blocks of cheddar cheese are currently trading at $1.384, 23 cents a pound higher than the Commodity Credit Corporation purchase price of $1.155.

3. The milk surplus problem is no longer an accurate description of the situation. The milk industry continues to have a milkfat surplus. But the supply of solids not fat is tight. Even as we see lower prices for milkfat (butter), we are seeing higher prices for solids not fat (nonfat dry milk). Unfortunately, in order to produce more solids not fat, the mechanism of the milk cow means we produce more milkfat.

4. Rapidly dropping feed costs and strong milk prices in the second half of 1989 will trigger a significant supply response in 1990.

5. The dairy title of the 1990 farm bill is beginning to get attention. A continued market oriented focus to the support level and *standby* supply management authority will be the key dimensions of the legislation.

6. Milk production in 1989 is making only a small gain over 1988, reflecting an increase of 0.75 percent over 1988.

7. Commercial demand for milk and dairy products had relatively strong growth from 1983 to 1988. For 1989, demand use was down the first half of the year by 0.3 percent, but should be up slightly for the year.

8. Commodity Credit Corporation purchases of surplus dairy product appear to be on the upswing, reaching 9.2 billion pounds milkfat equivalent in 1989.

9. The number of dairy heifers for milk cow replacements was up on July 1, 1989, for the first time in four years (44.6 heifers per 100 milk cows).

10. Cull cow prices through the first half of 1989 averaged $48 per 100 pounds (up $5 from 1986) and are expected to remain strong.

11. Milk cow prices are steady at $1,030 per head, up from $820 in 1986. Strong milk prices, high cull cow prices, and producer confidence will keep cow prices strong.--*Adapted from comments presented at the Midwest Outlook Conference on August 15, 1989, by R.E. Jacobson, Agricultural Economist, Ohio State University*

Selenium Bolus Available

A commercial two-inch bolus delivers 3 milligrams of selenium per day for 120 days. A short time lag (1 to 2 weeks) occurs from the time of administration until the osmotic pump delivers the 3 milligrams of selenium consistently. The half-inch diameter bolus can be delivered with a balling gun and is weighted to remain in the rumen-reticulum area of the stomach. This method of supplemental selenium will be beneficial when given to dry cows or cattle on pasture, who often do not receive concentrate containing selenium, or when injectable selenium is difficult to administer. Administered at drying off, the cow receives 3 milligrams during the entire 60-day dry period and during early lactation. The cost is typically $5 per bolus, which is more expensive than injectable or feed selenium sources.--*M.F. Hutjens, Extension Dairy Specialist*

Keeping Up with Research

The July and August issues of the *Journal of Dairy Science* contain several interesting research articles that will be useful for Illinois dairy producers and educators. An author and research institution are listed for further follow-up and questions.--*M.F. Hutjens, Extension Dairy Specialist*

Effect of Dietary Protein on Circulating Blood Progesterone

Sixty-three Holstein cows were fed diets containing 14 or 20 percent crude protein on a dry matter basis. Blood serum urea nitrogen was elevated with the high protein diet (12.7 versus 29.3 milligrams per deciliter). The higher protein diet did not affect milk yield or composition, but did increase dry matter intake (3.1 pounds of dry matter). Circulating concentrations of progesterone were lower in cows fed the 20 percent protein diet on days 12 of the

synchronized cycle (4.9 versus 3.5) and subsequent estrous cycles (3.8 versus 3.1 nanograms per milliliter).--*L.L. Larson, University of Nebraska, Lincoln*

Practical Application

High dietary protein can raise serum urea nitrogen levels and reduce circulating progesterone, which can reduce reproductive performance.

Effect of Yeast Culture and Sodium Bicarbonate

Twenty midlactation Holstein cows were fed a control diet, or diets with 0.75 percent sodium bicarbonate of the total ration dry matter, 1 percent added yeast culture on a dry matter basis, or a combination of sodium bicarbonate and yeast culture. The trial was conducted for 10 weeks with cows fed 40 percent corn silage and 60 percent concentrate. Yeast culture and sodium bicarbonate supplementation had no effect on feed intake, milk yield, or milk composition. A tendency for increased milk protein percent with yeast culture and 4 percent fat corrected milk with yeast culture and sodium bicarbonate was noted.

Practical Application

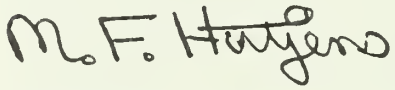
Production responses to yeast culture and sodium bicarbonate are variable and must be carefully evaluated by producers. Stage of breeding, diet composition, and feeding systems will affect results.

Effect of Maturity and Population Density on Corn Silage Feeding Response

Holstein cows were fed diets high in corn silage (75 percent of the forage dry matter) from early or late maturing hybrid corn planted at 34,000 or 68,000 plants per acre. Cows fed rations containing the early and late corn planted at 34,000 plants per acre had similar milk yield, feed intake, and rumen characteristics. Cows fed early maturing corn planted at 68,000 plants per acre had higher milk yield (5.1 pounds) and dry matter intake (6.6 pounds) than cows fed the late corn.--*J.H. Harrison, Washington State University, Puyallup*

Practical Application

If corn is planted at high population densities, it may be advantageous to plant an early hybrid. More research on varieties and population densities specifically for corn silage production is needed.



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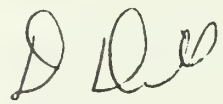

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

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IN THIS ISSUE

1990 Illinois Dairy Days Are Near

The energy aspects of forage production and culling strategies will be among the topics discussed in the upcoming 1990 Illinois Dairy Days. This year's theme is "Making the Difference". The latest research and Extension information will be presented at 10 locations across Illinois. Topics and speakers include "Managing Rumen Digestion" by Mike Hutjens; "Energy Aspects of Forage Production," Stan Smith or Dave Fischer; "Culling Strategies," Dewayne Dill; and "Herd Health Update," Dave McQueen. Programs will start at 10:30 a.m. The registration fee is $4 per farm. Meeting dates and locations are listed below.

January 8 Pekin (First United Methodist Church)
January 9 Dixon (Brandywine Inn)
January 10 Freeport (Masonic Temple)
January 10 Elizabeth (Community Building)
January 11 Marengo (Cloven Hoof Restaurant)
January 12 Kankakee (Redwood Inn)
January 16 Quincy (Farm Bureau Building)
January 17 St. Libory (American Legion)
January 18 Breese (American Legion)
January 19 Teutopolis (Knights of Columbus)

Use of Feed Additives

Results of a recent survey of New York herd owners in the DHI (Dairy Herd Improvement) program indicate that buffers were the most commonly bought feed additives. The herd owners were surveyed to determine which additives were tried and continued to be used on their farms (Table 1). The results indicate that buffers were the most popular additive. They were used initially by 67.6 percent of the herd owners. Because herd owners perceived buffers to be beneficial, 76.9 percent of those who initially used buffers continued to use them.

Table 1. Use of Feed Additives and Continued Feeding of Various Additives in New York DHI Herds in 1987

Additive	Initial use	Continued use
	percent	
Buffers	67.6	76.9
Niacin	14.4	70.1
Yeast	17.2	51.2
Isoacids	13.0	38.5
Ionophore (heifers)	35.4	91.5

Ionophores had the highest continued use (over 90 percent), but a lower rate of adoption. Illinois dairy producers should consider feeding an ionophore (monensin or lasalocid) to improve heifer growth, increase feed efficiency, and control coccidiosis (lasalocid). Niacin was used on fewer farms, but with good acceptance. This trend reflects the need to target niacin supplementation to herds that will respond. The low rate of continuous isoacid use reflects the variable field response reported by dairy farmers. The use of yeast is still experimental. The New York data illustrate that Illinois farmers should evaluate feed additives on their farms. If no economical response is measured or observed, the additive should be discontinued.--*M.F. Hutjens, Extension Dairy Specialist*

Table 4. Percentage of Illinois Dairy Farmers Using Various Heifer Management Practices

Practice	Percent	Practice	Percent
Calving in a maternity pen	84	Injecting selenium	19
Feeding whole milk	72	Adding decoquinate	66
Feeding mastitis milk	47	Feeding an ionophore	69
Feeding milk replacer	44	Deworming heifers	97
Feeding soured colostrum	16	Breeding heifers AI[a]	95
Using hutch	59	Using heat synchronization	31
Using nasal vaccine	28	Selecting calving-ease bulls	69

[a]Artificial insemination.

Keeping Up with Research

The *Journal of Dairy Science* has several interesting articles that may be useful for Illinois dairy producers, agro-industry leaders, and educators. An author and research institution are listed for follow-up and questions.--*M.F. Hutjens, Extension Dairy Specialist*

Effect of Alfalfa Maturity on Milk Production

Eighteen Holstein cows were fed a ration containing similar levels of fiber, using three different maturities of alfalfa hay (Table 5). Cows fed the ration with early vegetative hay produced as much milk as the cows that were fed a ration of later maturing alfalfa with higher levels of grain. Dry matter intake and milk composition were similar for both groups of cows. Later maturity hay required more eating time, but rumination times were similar.--*D.K. Combs, University of Wisconsin*

Practical Application

High-quality alfalfa forage can support high levels of milk production with lower levels of grain. Dairy managers must adjust rations to maximize performance and optimize profitability.

Composition Variation of By-Product Feeds

Four to ten samples of corn gluten feed, soybean hulls, distillers' dried grains, and whole cottonseed were collected and analyzed (Table 6). Fiber, protein, and in vitro digestibilities varied from 1 to 14 percent (with most samples varying less than 5 percent). Nutrient content of by-product feeds in this study did not agree well with earlier published values. Processing methods may cause nutrient content to vary with time.--*R.L. Belyea, University of Missouri*

Practical Application

Rations using by-product feeds should be evaluated to avoid nutrient shortages or imbalances. Book values could lead to nutritional problems and testing should be encouraged.

Table 5. Comparison of Alfalfa Diets and Their Effect on Eating Time and Milk Production

	Alfalfa maturity		
	Early vegetative	Late bud	Full bloom
Alfalfa crude protein[a] (percent DM)	26.7	20.6	18.7
Alfalfa ADF[b] (percent DM)	36.1	51.7	51.7
Alfalfa (percent diet)	68	53	45
Dry matter intake (pounds/day)	55.2	54.8	57.0
Milk (pounds/day)	79.4	82.9	82.6
Milk fat (percent)	3.30	3.23	3.12
Milk protein (percent)	3.05	2.96	2.94
Eating time (minutes/day)	267	372	340
Ruminating time (minutes/day)	401	409	417

[a]Dry matter. [b]Acid-detergent fiber.

Table 6. Nutrient Content and Variation in By-Product Feeds Expressed As A Percentage of Dry Matter

	Corn gluten		Distillers'		Soy hulls		Cottonseed	
	Ave.	SD[a]	Ave.	SD	Ave.	SD	Ave.	SD
Protein	23.3	1.4	30.6	1.4	11.8	0.2	24.7	2.2
Acid-detergent fiber (ADF)	13.4	0.7	15.3	1.0	52.8	1.2	37.1	3.2
Neutral-detergent fiber (NDF)	51.9	2.3	33.0	1.5	72.5	0.8	48.7	3.6
Fat	6.6	1.9	7.4	0.9	0.8	0.3	16.9	1.5
Phosphorus	0.89	0.15	0.69	0.02	0.08	0.01	0.58	0.04

[a]Standard deviation, which represents the variation between samples (the average, plus or minus the SD value, would include 2/3 of all sampled values).

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Vol 19, No. 1 February 1990

IN THIS ISSUE

Dairy Forage Workshop Is Set for February 27

An in-depth workshop--"Optimizing Your Dairy Forage System"--will be held February 27 and 28 in Champaign, Illinois. The workshop will focus on four aspects of the dairy forage system: (1) the agronomic aspects, (2) harvesting alternatives, (3) storage options, and (4) forage feeding. Speakers will include Mike Hutjens, Darrell Miller, Jim Kaiser, Ed Jaster, and James Drackley.

The workshop will begin at 10:30 a.m. on February 27 and will conclude at noon on February 28. It will be held at the Best Western Paradise Inn, Savoy, Illinois. The registration fee of $35 per farm includes workshop materials, computerized ration analyses, and computer analysis of alternative forage systems. Pre-registration is required. Registrations should be sent to the Dairy Extension Office, Department of Animal Sciences, 326 Mumford Hall, 1301 West Gregory Drive, Urbana, Illinois 61801. Motel reservations ($29 single, $37 double) can be made by calling (217)356-1284 or (800)528-1234.--*D.E. Dill, Extension Dairy Specialist*

Two Chances to Attend Four-State Dairy Seminar

"Feeding For Profit" is the theme for the four-state dairy seminars for 1990. Illinois dairy producers and agribusinesses will have two opportunities to participate: March 6 at the American Legion Hall, Breese, and March 7 at Hoffman Hall, Loras College, Dubuque, Iowa. The program is designed to present the latest research and information. The topics and speakers are listed below:

- Balancing Carbohydrates for High Producing Cow Rations, Mike Hutjens, University of Illinois;
- Fat and Animal Protein By-Products in Dairy Cattle, Randy Shaver, University of Wisconsin;
- Feeding Systems for the 1990s, Lee Kilmer, Iowa State University;
- Managing Profitability in the 1990s, Joe Conlin, University of Minnesota.

The registration fee of $15 includes lunch, seminar proceedings, and the program. Registrations for the Illinois seminar should be sent to the Clinton County Extension Office, Box 185, Breese, Illinois 62230, and for the Iowa seminar to the Dubuque County Extension Office, Plaza 20, 2600 Dodge Street, Dubuque, Iowa 52001.--*M.F. Hutjens, Extension Dairy Specialist*

Feeding for High Milk Protein

Strong market signals are being sent to Illinois dairy farmers concerning milk protein. Cheese plants are paying 10 to 20 cents per 1 point of milk protein over 3.2 percent, which is higher than the price paid for the fat differential. The USDA reduced the milk price support by 50 cents per hundredweight on January 1, 1990, with butter (milk fat) bearing the full cost reduction of 11 cents per pound.

Feeding can influence the level of milk protein. Unfortunately, most feeding factors depress milk protein (Table 1). The key factors to obtaining the genetic potential of milk protein are to maximize microbial protein yield, which can provide 50 to 80 percent of total protein needs, and to balance the undegradable protein to meet the cow's needs.

Table 1. Causes of Low Milk Protein

Cause	Correction
Shortage of degradable protein	Provide 60 to 65 percent of total protein as DIP (degradable intake protein) to optimize microbial protein.
Shortage of undegradable protein	Provide 35 to 40 percent total protein as UIP (undegradable intake protein) to complement microbial protein synthesis.
Incorrect balance of amino acids from undegradable protein sources	Include some soybean meal, heated soy products, animal, and/or fish protein source and limit corn protein sources to half of the total protein in protein supplements.
Lack of fermentable organic matter in the rumen	Balance carbohydrate levels to 40 percent nonfiber carbohydrate and 30 percent neutral detergent fiber (NDF) of the dry matter.
Low rumen pH	Stabilize rumen pH values from 6.2 to 6.5 to maximize microbial growth.
Added fats and oils	Limit added fats and oils to 1 to 1 1/2 pounds from unprotected fat source (oilseeds and animal fat).

Economics limit the amount of extra protein that should be fed. The guideline is that milk protein will increase 0.02 percent per one percent increase in dietary protein. A one percent increase in milk protein will require 0.4 pounds of dietary protein or one pound of soybean meal equivalent. If a cow consumes 40 pounds of feed dry matter a day, the additional dietary protein would cost 10 cents to 12 cents per cow per day. However, the extra milk protein would only be worth 5 cents, assuming the cow would yield 50 pounds of milk and the protein premiums were 10 cents per 1 point of milk protein.

The following recommendations should result in optimal milk protein yields:

1. Meet the amount of crude protein needed for various levels of milk yield (12 to 18 percent crude protein in the total ration dry matter).
2. Check degradable and undegradable protein levels of the total dietary protein (60 to 65 percent and 35 to 40 percent, respectively).
3. Maximize microbial protein yield by stabilizing rumen environment (pH of 6.2 to 6.8) and balancing fiber and fermentable carbohydrate needs.
4. Supplemental niacin and yeast may be helpful, but research results are variable.
5. Feeding extra fat can lower milk protein yields (each pound of added fat can lower milk protein by 0.1 to 0.15 percent).--*M.F. Hutjens, Extension Dairy Specialist*

Milk Protein Measurements: Total Protein versus True Protein

In recent months the National Cooperative Dairy Herd Improvement Program (NCDHIP) has discussed the merits of measuring and reporting true milk protein rather than total milk protein as is presently done. This discussion was precipitated by the New York Department of Agriculture and Markets requiring the Northeast DHI program to switch to true protein measurements. The New York producers, particularly the purebred breeders, feared that this legislation would adversely affect them unless the entire nation converted to measuring true protein.

Milk contains approximately 3.5 percent protein (Table 2). In normal milk, 80 percent of the protein is casein, 17 percent is α lactalbumin and ß lactoglobulin, and the remaining 3 percent is nonprotein nitrogen (NPN). The total protein measurement includes NPN while the true protein measurement does not. Since NPN is not a true protein, it contributes nothing to cheese yield and has no nutritional value to consumers.

Table 2. Composition of Milk

Constituent	Average content	Normal variation
	--------*percent*--------	
Water	87.2	82.4 - 90.7
Total solids	12.8	9.3 - 17.6
(a) Fat (milk fat)	3.7	2.5 - 6.0
(b) Solids—not fat	9.1	6.8 - 11.6
(i) Protein	3.5	2.7 - 4.8
-Casein	2.7	2.3 - 4.0
-Lactalbumins and lactoglobulins	0.7	0.4 - 0.8
-Nonprotein nitrogen	0.1	0.1 - 0.2
(ii) Lactose (milk sugar)	4.9	3.5 - 6.0
(iii) Minerals	0.7	0.6 - 0.8

The NCDHIP Policy Board at its December 1989 meeting decided not to act on a proposal to convert to true protein. It has been reported but not confirmed that the New York legislature has rescinded its ruling that the Northeast DHI program convert to true protein measurements. It appears that this controversy will pass without changing how milk protein is measured or reported.--*D.E. Dill, Extension Dairy Specialist*

Computer Program Prices By-Product Feeds

A new commercial computer program is available that calculates the break-even prices of by-product feeds using energy, protein, fat (oil), phosphorus, and undegradable protein values. Table 3 lists break-even values using energy (shelled corn at $2.20 per bushel), protein (soybean meal at $220 per ton), fat (tallow at 22 cents per pound), phosphorus (dicalcium phosphate at $350 per ton), and undegradable protein (soybean meal as a basis of comparison). If a dairy farmer can purchase the by-product feed below the break-even price, it is a good buy. A feed that increases in value on an undegradable basis compared with crude protein basis has a higher bypass protein value when compared to soybean meal. Dairy cows must use each nutrient for its specific function (for example, bypass protein must be fed to cows that will respond with high milk yield). Several good buys are available in Illinois.--*M.F. Hutjens, Extension Dairy Specialist*

Controlling Environmental Mastitis

Cold, wet winter and spring weather are ideal conditions for environmental mastitis problems. This type of mastitis is contrasted with contagious mastitis in Table 4. The primary differences are the type of bacterial species, the primary location of the organisms, and the visual signs of infection.

Postmilking teat dipping and dry-cow treatment have proven effective in controlling mastitis caused by contagious bacteria. These practices, however, have not proven effective in the control of environmental mastitis. Sanitation is the key to controlling mastitis caused by environmental organisms. Wet, sloppy conditions expose the teat to a hostile environment teeming with mastitis-causing bacteria. Several management practices could be considered:

1. Major traffic routes between the milking, feeding, and resting areas should be free of mud. This area can be concrete, gravel, or other hard surface that does not absorb water. The exit from the milking area is particularly important. It takes from thirty minutes to two hours for the sphincter to close the teat orifice following milking. Since the teat is most susceptible to infection during this time, cows should be encouraged to remain standing. This is best accomplished by providing fresh feed following milking.
2. Bedding area must remain dry. If a straw and manure hard pack is used for bedding, sufficient straw should be used to keep the pack free from wet areas. Freestalls may need to be cleaned and bedded more frequently, particularly if lots and alleys cannot be scraped. Wet manure carried into the freestall from the cow's feet is deposited at the back of the freestall where the cow's udder will lie, increasing the exposure to environmental bacteria.
3. Clip long hairs from udders and tails. This will decrease the amount of dirt and manure that clings to the udder and will permit cleaning the udder with a minimal amount of water.

Table 3. Break-Even Prices for Illinois By-Product Feeds with Protein Priced on A Crude Protein and Undegradable Protein Basis

By-product feed	Protein basis: Crude	Protein basis: Undegradable
	--------*dollars per ton*------	
Corn gluten feed, dry	127	97
Cottonseed, fuzzy	186	169
Soy hulls	81	58
Beet pulp	64	51
Soybeans, raw	247	185
Soybeans, roasted	264	302
Blood meal	369	778
Corn gluten meal	291	458
Meat and bone meal	332	508
Fish meal	356	573

Table 4. Contrasting Characteristics of Environmental and Contagious Mastitis

Characteristic	Environmental mastitis	Contagious mastitis
Major bacterial species	*Streptococcus* non ag *Coliform*	*Streptococcus agalactiae* *Staphylococcus aureus*
Primary location of organisms	Animal's environment	Inside udder
Visual signs	Often clinical	Often subclinical
Duration of infection	Short	Long
Bulk tank somatic cell count	Often low	Often high

4. Use water conservatively. A wet udder and flanks will sooner or later result in mastitis.--*D.E. Dill, Extension Dairy Specialist*

Some Considerations in Feeding Grass Clippings to Cattle

Because of the ban on organic wastes in landfills starting in July 1990, interest in feeding these products to cattle has occurred. Several concerns must be addressed before these products can be used as a feed source.

The biggest obstacle to using grass clippings as cattle feed is the herbicides and insecticides used in lawn care that are not approved for use on forages fed to livestock. If these products are approved for livestock forage or if the residues are not present in sufficient quantity to cause a problem, grass clippings could be used to feed cattle. This use would depend upon governmental approval. Metal, glass, and other scrub debris in clippings, such as yew plants, could be detrimental or fatal when fed to livestock.

If the problems of residue and debris can be solved, other problems should be addressed. The clippings must be fed within six to twelve hours or molds and spoilage would be detrimental to livestock. The clippings may be too wet to ensile properly unless corn or other dry feed is added. As the dry matter content of the clippings changes, the mixture will need to be adjusted to match cattle needs. For optimal fermentation, the dry matter content of the mixture should be 30 to 35 percent for bunker or bag storage, 35 to 50 percent for conventional upright silos, and 50 to 65 percent for oxygen-limiting structures. Small quantities of clippings may limit successful ensiling and lead to excessive surface spoilage.

Drying clippings is another alternative. The feed value of the clippings would vary with variety, season, and year. Periodically a complete nutrient analysis will be necessary to adequately supplement the forage.

If such problems are overcome, grass clippings can provide a high quality forage for cattle. The nutrient content of immature bluegrass is shown in Table 5. This represents an average value for a forage that can be highly variable. Other organic wastes such as tree limbs are low in nutrients, making them unsuitable for catttle feed unless they undergo extensive physical and chemical treatment. *--D.B. Faulkner and M.F. Hutjens, Extension Beef and Dairy Specialists*

1990 Illinois Dairy Report Is Available

Limited copies of our *1990 Illinois Dairy Report* are available for four dollars plus postage (total of five dollars payable to Dairy Extension). The 98-page booklet features five Area Dairy Day summaries (rumen factors, forage production, culling, Lyme disease, and health update). Sixteen research reports cover fatty liver, milk protein yield factors, fiber digestion, leukemia, calf nutrition, feeding fat, the Heifer Hustle program, DUMPS, mastitis, and automation. This fact-filled booklet is a must to keep abreast of research and Extension information.--*M.F. Hutjens, Extension Dairy Specialist*

Table 5. Nutrient Content of Immature Pure Kentucky Bluegrass

Nutrient content	Average	Range
Dry matter, percent	20.0	15.0 - 35.0
Protein, percent	17.5	10.0 - 20.0
Net energy-lactation, Mcal/lb	0.72	0.57 - 0.76
Acid detergent fiber, percent	29.0	26.0 - 40.0
Neutral detergent fiber, percent	55.0	50.0 - 69.0
Total digestible nutrients, percent	69.6	55.0 - 75.0
Calcium, percent	0.43	0.2 - 0.5
Phosphorus, percent	0.40	0.1 - 0.4
Potassium, percent	2.26	1.0 - 2.5

M.F. Hutjens
Extension Dairy Specialist

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Vol. 19 No. 2 May 1990

IN THIS ISSUE

Milk Quality Council Formed in Northwest Illinois

Dairy producers, agribusinesses, and the Cooperative Extension Services in JoDaviess and Stephenson counties have formed a milk quality council. The goals and objectives of the organization include:

- Marketing the highest quality milk so the producer is able to qualify for dairy plant premiums.
- Improving the shelf life and consistency of dairy products to gain added consumer confidence.
- Increasing adoption of research-proven practices that individual farmers can easily adapt to their own operations.
- Improving utilization of local professionals.
- Increasing the use of scheduled maintenance programs for milking equipment.
- Increasing the number of dairy farms on udder health programs.

The council will also sponsor educational programs and provide an integrated team of professionals to diagnose herd problems. -- *D. E. Dill, Extension Dairy Specialist*

Management Factor Trends in Illinois Holstein Herds

A summary of selected management factors for Illinois Holstein herds at five herd production levels is contained in Table 1. Current noteworthy trends show that:

1. Although total feed cost increases as herd production levels increase, the return per dollar of feed cost, which is a measure of the efficiency of production, also increases. However, the increase in efficiency peaks at approximately 20,000 pounds of milk and begins decreasing for herds with a rolling herd average greater than 21,000. This trend must be monitored closely.
2. The percent of first lactation animals increases with increasing herd production levels, and the average age of the herd and average age at first freshening decreases. This trend toward a younger herd might explain the increase in percent of difficult births (calving difficulty score of 4 or 5).
3. Average days dry decreases and percent dry, 40 to 70 days, increases with increasing herd production level. However, the other reproductive factors are nearly equal.
4. The 305-2X-ME lactation averages for first lactation animals were lower relative to the herd average for high-producing herds compared with low-producing herds. This is primarily due to the increase in culling rate in the high-producing herds. However, these herds could benefit from an increased selection of heifers entering the herd and a reduced culling rate. -- *D. E. Dill, Extension Dairy Specialist*

Proposed Amendments to Illinois Livestock Waste Regulations

The Illinois Environmental Protection Agency (IEPA) has submitted a proposal to the Illinois Pollution Control Board to amend the Illinois Livestock Waste Regulations. The proposed amendments pertain to the location of new facilities and the land application of wastes in proximity of

Table 1. Management Factors for Illinois Holstein Herds by Herd Production Level in Pounds of Milk

Management factors	13,000 to 14,999	15,000 to 16,999	17,000 to 18,999	19,000 to 20,999	> 21,000
Annual cost and return per cow					
Total feed cost	$790	$822	$ 896	$948	$1,105
Milk value	$1,850	$2,070	$2,298	$2,550	$2,784
Income per feed cost	$1,060	$1,248	$1,402	$1,602	$1,679
Feed cost per hundredweight of milk	$5.48	$5.10	$5.04	$4.80	$5.15
Return per dollar of feed cost	$2.56	$2.67	$2.76	$2.94	$2.61
Production					
Summit milk					
Lactation 1	50.8	55.7	60.7	65.8	69.9
Lactation 2+	66.4	73.1	81.0	88.7	95.3
Average	61.5	67.3	74.1	80.8	86.2
Percent lactation 1	31	33	35	35	37
Average age at first freshening (years-months)	2-04	2-03	2-03	2-03	2-02
Average age of herd (years-months)	4-03	4-01	4-00	4-00	3-10
305-2X-ME percent of average					
Lactation 1	99	99	98	97	97
Lactation 4+	100	100	100	100	101
Reproduction					
Average days dry	68	66	63	62	58
Percent dry 40 to 70 days	48	57	67	71	68
Average days open	131	133	129	129	131
Days to first bred	94	90	89	92	90
Days minimum freshening interval	408	411	407	407	410
Average services per conception	1.7	1.9	1.9	1.8	1.8
Offspring born					
Percent with calving difficulty scores 4 and 5	2.9	3.1	4.3	5.5	5.6
Percent born dead	9	8	8	8	9

residences. These amendments were formulated by the IEPA following three years of discussions with producer groups and others. Four public information meetings were also conducted by the IEPA before drafting the final version of the proposal. The major proposed changes state that:

1. New livestock facilities shall not be located within 1/2 mile of a populated area (any area with at least 10 nonfarm residences) or within 1/4 mile of a single nonfarm residence.
2. Livestock waste shall not be applied on soils located within 1/4 mile of a populated area unless the waste is incorporated into the soil within 24 hours of the time of application or the waste is applied by a direct injection method. The only exception is if the waste is applied on frozen ground and the producer has no other property available where it can be applied.

For complete copies of the proposed changes, call A.G. Taylor of the IEPA at (217)782-3397.

The Illinois Pollution Control Board will hold 5 hearings throughout Illinois to discuss the merits of these proposed changes. Anyone wishing to participate in the hearings should contact the Hearing Officer, Michelle Tarallo, at (815) 753-0947 prior to the hearing. -- *A. J. Muehling, Extension Dairy Specialist*

Hearing dates, times, and places:

Tuesday, August 14, 1990, 9:00 a.m.
DeKalb County Farm Bureau, DeKalb

Monday, August 20, 1990, 9:00 a.m.
Effingham County Extension Office, Effingham

Tuesday, August 21, 1990, 9:00 a.m.
John A. Logan Community College, Carterville

Thursday, August 23, 1990, 9:00 a.m.
Morgan County Extension Office, Jacksonville

Friday, August 24, 1990, 9:00 a.m.
Knox AgriCenter, Galesburg

Professional Dairy Management Seminar Scheduled

A Professional Dairy Management Seminar has been scheduled for July 17 and 18 in Ames, Iowa. The program will include both a general session as well as several concurrent breakout sessions. Nutrition, health, milk quality, DHI records, farm family stress, labor relations, and heifer raising will be some of the topics discussed.

The conference cost is $135 for the first person from a farm or firm and $85 for each additional person. However, if registration is received before June 1, the cost is $115 and $70 respectively. (Lodging is not included in the registration fee.) For additional information contact Ron Orth, Iowa State University Extension Dairy Specialist, at (515)292-2116. -- *D. E. Dill, Extension Dairy Specialist.*

Feeding for 25,000 Pounds of Milk

With milk production continuing to climb, balanced feed rations are a must. In Table 2, University of Wisconsin Extension specialists summarized the feeding programs of several top Wisconsin herds.

It is fascinating to study the how and why of feeding strategies. In this study, the varying methods included:

- Haylage being fed in all rations while feeding baled hay and corn silage varied and represented small amounts.
- Forage intake being relatively low on most farms (less than 50 percent).
- Shelled or ear corn being successfully used.
- Oilseeds being added on all farms with cottonseed the more popular choice.
- Additional fat or oils being included along with oilseeds.
- Animal protein being used on most farms.
- Niacin being added to every ration while buffers were less commonly used. Magnesium oxide appears to be used as a source of magnesium in rations.
- Other additives varying in use and level.

The differing results included:

- Milk protein tests appearing lower compared to milk fat (a typical milk protein to milk fat ratio of 85 to 88 percent).
- Dry matter intake varying among herds by 10 pounds (from high to low). (This is surprising!)

The study showed that high-producing cows can be fed a variety of feed ingredients (no one right ration), that rations are carefully built with known amounts of feed ingredients, and that cows eat high levels of dry matter.

We are currently collecting similar Illinois data which will appear in a future issue. -- *M. F. Hutjens, Extension Dairy Specialist*

Commodity Feed Values

As the price of soybean meal and shelled corn shifts in the market, the value of by-product and commodity feeds changes. The values of feeds listed in Table 3 were based

Table 2. Ration Ingredients and Amounts Fed to High-Producing Wisconsin Herds

	Herd A	Herd B	Herd C	Herd D	Herd E
	pounds of dry matter per cow per day				
Forages					
Hay	0	4.4	3.4	0	0
Haylage	18.1	16.7	13.8	25.2	20.7
Corn Silage	7.8	0	4.2	0	10.4
Grain					
High moisture corn	16.5	18.0	0	0	8.7
High moisture ear corn	0	0	15.1	17.3	0
Cottonseed	5.8	4.7	0	6.0	0
Blood meal	.5	1.27	.6	.9	0
Distillers grain	2.7	0	1.8	0	0
Linseed meal	0	0	0	1.8	0
Meat and bone	1.5	1.9	1.9	1.9	0
Roasted soybeans	0	0	4.0	0	8.7
Soybean meal	2.7	2.2	2.0	2.7	0
Urea	0	0	0	0	.2
Minerals					
Sodium bicarbonate	.23	0	0	.25	.31
Magnesium oxide	.15	.05	.10	.12	.09
Salt	.15	.15	.15	.23	.21
Dicalcium phosphate	0	0	.20	.38	.37
Limestone	.25	.39	0	0	0
Specialty feeds					
Protected fat	.62	0	0	.62	0
Tallow	0	.80	1.0	1.2	.9
Yeast	0	.25	0	.42	.49
Niacin	.015	.015	.015	.026	.020
Vitamins	.06	0	.08	.16	.04
Antibiotics	0	0	0	.04	.04
Isoacids	0	.20	0	.22	0
Zinc methionine	0	.01	0	.01	.01
Herd summary					
Milk					
Annual milk yield per cow (lbs)	26,955	26,257	25,616	26,913	25,401
Number of cows in herd	82	84	104	114	143
Dry matter intake (lb)	57.0	50.6	48.2	59.4	51.5
Milking (times)	3X	3X	2X	3X	3X
Milk fat (%)	3.78	3.83	3.92	3.66	3.68
Milk protein (%)	3.10	3.12	3.21	3.05	3.08

Table 3. Economic Value of Commodity Feeds on a Crude Protein and Undegradable Protein Basis

	Crude protein	Undegradable protein
	--------dollars per ton--------	
Blood meal	268	483
Brewers grain, dry	133	154
Brewers grain (24 DM)	34	36
Corn gluten feed	120	101
Cottonseed, whole	166	153
Distillers grain	144	185
Meat and bone meal	127	362
Soybeans, raw	205	181
Soybeans, heated	219	257

on shelled corn ($86 per ton) as an energy source, 44 percent soybean meal ($180 per ton) as a protein source, animal fat ($420 per ton) as a fat or oil source, and dicalcium phosphate ($350 per ton) as a phosphorus source.

If a dairy producer or feed manufacturer can purchase a feed ingredient and have it delivered to his farm for less than the feed value, that feed is a "good buy" compared to base feeds. The undegraded protein value reflects feeds higher in bypass or undegraded rumen protein compared to soybean meal (which is the base feed for pricing). Cows must use the nutrients as intended and only cows that will respond to undegradable protein or added fat can recover higher ingredient costs. Several feeds have storage or handling limitations and must be balanced with other feeds to obtain optimal performance. -- *M. F. Hutjens, Extension Dairy Specialist*

1989 Milk Production Statistics

The 1989 USDA milk production figure from the Agricultural Statistics Board reveals interesting trends as illustrated in Table 4. The good news for Illinois dairy producers is that milk yield per cow continued to increase at a faster rate (307 pounds) compared to the U.S. average increase of 99 pounds. Illinois cows produced more milk per cow than Wisconsin cows in 1989 (123 pounds). But, all indications are not positive. Illinois' share of the national milk market declined slightly. Average milk yields lag behind the U.S. average, and Iowa and Indiana are sneaking up. Western state cows continue to maintain nearly a 4000-pound advantage over Illinois cows.

The dairy industry will continue to be a competitive business. Illinois dairy managers must continue to position their enterprises for the 1990s with improved milk yields, competitive and functional herd sizes, and lower production costs as milk prices have dropped nearly $2 per hundredweight. -- *M. F. Hutjens, Extension Dairy Specialist*

Table 4. Annual Milk Production Data by State and for the United States

	Milk cows		Milk per cow		Milk yield (1989 as % of 1988)
	1988	1989	1988	1989	
	----thousands-----		*------pounds-----*		
Illinois	206	197	13,617	13,924	98
Wisconsin	1,750	1,739	14,205	13,801	99
Indiana	172	162	12,988	13,772	100
Iowa	307	309	13,160	13,599	104
Missouri	230	228	13,043	13,048	99
Washington	221	225	17,946	18,209	103
California	1,083	1,104	17,181	17,530	104
U.S.	10,262	10,127	14,145	14,244	99

Keeping Up with Research

Recent research reports that appeared in the *Journal of Dairy Science* are summarized below. Contact authors and institutions are identified allowing readers to follow-up on articles or topics. Copies of entire articles are available in the Dairy Extension Office. -- *M. F. Hutjens and D. E. Dill, Extension Dairy Specialists*

Alternative Protein Sources with Alfalfa Haylage

Three experiments were conducted to evaluate the substitution of and amount of soybean meal, expeller soybean meal, or corn by-products (distillers grain and corn gluten meal) on milk production. Alfalfa silage, containing 21 percent crude protein, was the sole source of forage, fed at the rate of 55 percent of total dry matter.

- Trial 1 found that expeller soybean meal increased milk yield compared to soybean meal by 2.2 pounds.
- Trial 2 found that expeller soybean meal out-produced soybean meal by 1.1 pounds of milk. Dry matter intake was 10 pounds lower on Trial 2 (44 pounds) compared to Trial 1 (54 pounds) and soybean meal diets were found to be superior to the alfalfa control diet.
- Trial 3 found that all three protein additions (including corn by-products) were superior to alfalfa control diets in milk yield, milk fat, and milk protein.

Responses to supplemental protein appeared to decrease with increasing dry matter intake. -- *G.A. Broderick, University of Wisconsin, Madison.*

Practical Applications: Rumen undegradable protein sources (expeller soybean meal and corn by-products) can replace greater amounts of protein from solvent soybean meal. Absorbed protein supplied by alfalfa silage may also be limiting without additional sources.

Effects of Carbohydrate and Fat on Milk Production and Composition

Forty Holstein cows were fed diets containing different carbohydrate sources (corn or dried whey) with or without a fat source (soybean meal or extruded soybeans). Milk production increased 2.4 pounds with dried whey in the diet. Carbohydrate source did not affect milk fat (3.14 versus 3.09 percent) or milk protein (2.98 versus 2.99 percent). Production increased with extruded soybeans (6.4 pounds), but milk fat test dropped (3.26 versus 2.98 percent) and milk protein test dropped (3.03 versus 2.95 percent). Feeding a readily fermentable carbohydrate source of dried whey instead of corn in a high fat diet (5.5 percent) did not change milk yield. Fat interfered with amino acid uptake by the mammary gland. -- *D.J. Schingoethe, South Dakota State University, Brookings.*

Practical Applications: Feeding early lactation dairy cows added fat can increase milk yield, but may affect milk components. Adding a source of fermentable carbohydrate does not alleviate the milk protein depression resulting from fat feeding.

Relationship of Selenium and Vitamin E on Mammary Gland Health

Nine well-managed herds were monitored for one year to determine if somatic cell counts (SCC) or clinical mastitis were associated with dietary and plasma selenium and vitamin E. Selenium intake varied from 1 to 16 milligrams (mg) per day while vitamin E ranged from 100 to 900 International Units (IU) per day. Plasma selenium concentrations were related to intake below 5 mg per day.

Vitamin E plasma levels were more sensitive to intake in dry cows. Bulk milk SCC decreased significantly as plasma selenium increased. The rate of clinical mastitis dropped as plasma selenium and vitamin E concentrations increased. Feeding only high rates of selenium did not decrease clinical mastitis, but required vitamin E with selenium. Maximum plasma selenium occurred when cows were fed 5 mg per day. Dry cows in this study were either not receiving or were absorbing adequate dietary selenium (based on plasma analysis) even though the level exceeded National Research Council guidelines. Plasma vitamin E levels were relatively constant during the dry period until 7 days prepartum. Vitamin E concentrations dropped 50 percent and remained low until 20 to 30 days postpartum and then increased until 60 days postpartum -- *K. L. Smith, Ohio State University, Wooster.*

Practical Applications: Vitamin E and selenium are related to the rate of clinical mastitis and SCC in herds that have controlled contagious mastitis. Dairy managers should consider adding 5 to 6 mg of selenium and 300 to 500 IU of vitamin E to all rations (especially dry cow rations.)

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Vol. 19, No. 3 September 1990

IN THIS ISSUE:

November Update Set—Feeding and Systems Research

The latest dairy research and recommendations will be presented at the University of Illinois Dairy Feeding and Systems Research Update on November 29 from 9 a.m. to 3 p.m. at the Best Western Paradise Inn Motel, Savoy. The fast-paced format will allow ample time for questions from dairy producers, feed dealers, and veterinarians. The cost is $25 per person, with pre-registration required. To preregister, call (217)333-2928.

Dairy Herd Improvement Lists New Statistic—Management Level Milk

On August 15, the Mid-States Dairy Records Processing Center (DRPC) began printing a new statistic on the Mid-States Herd Summary, DHIA-202. This statistic, called Management Level Milk (MLM), when printed for each test day during the year, will facilitate a month to month comparison of test day milk.

Management Level Milk is defined as the estimated average milk production on test day, if we hypothesize all cows in the herd to be second-lactation cows, 150 days in milk, and producing milk with 4 percent butterfat and 3.3 percent protein. MLM is calculated by adjusting the milk, fat, and protein production for lactation number and stage of lactation, and then averaging the adjusted value for all milking cows in the herd. The following equation is used:

MLM = [(29.15 x Milk Factor)
+ (12.3 x Fat Factor x Test-Day Fat Percent)
+ (6.56 x Protein Factor x Test day Protein Percent)]
x Test-Day Milk Pounds ÷ 100

The milk, fat, and protein factors are obtained from a table based on the animal's lactation number and days in milk. Separate tables have been developed for Guernseys, Jerseys, and all other breeds.

MLM should be used to monitor production and evaluate the effect of management changes. The statistic should remain constant from one month to the next unless significant management changes are made (such as ration change or cows culled). If a management change is made, however, the statistic will indicate a corresponding increase or decrease in production.

MLM can also be used to compare production between individual cows. To receive the statistic on a per cow basis, a Flexible Management Report (FMR) that includes Field 433 must be requested.--*D.E. Dill, Extension Dairy Specialist*

Bovine Spongiform Encephalopathy Update

Bovine Spongiform Encephalopathy, sometimes called the "mad cow disease," is a fatal degenerative disease affecting the central nervous system of cattle. There is no specific evidence indicating that BSE is a human health hazard, and the disease, first diagnosed in Great Britain in 1986, is not known to exist in the United States.

The most widely held theory is that the pathogen causing BSE originated from sheep scapie virus, which is transmitted to cattle through meat and bone meal from diseased sheep.

The Animal and Plant Health Inspection Service (APHIS) and the USDA have prohibited the importing of live cattle and zoo ruminants from the United Kingdom. For several years, too, no British meat, bone meal, sheep, or goats

have been imported to the United States. In Illinois and 15 other states, a BSE surveillance program is in place, along with specific training programs for field staff.

The American Feed Industry Association (AFIA), acting with the National Renderers Association and the Animal Protein Producer's Industry, has made several recommendations: Renderers should refrain from picking up diseased, dying, disabled, or dead sheep. Packers and renderers who process sheep offal from other facilities should divert the rendered sheep protein to uses other than dietary supplements for dairy or beef cattle. Likewise, dairy farmers should know the source of meat and bone meal used.

Awareness of BSE is increasing. In the United Kingdom, beef consumption is reported to be down 15 to 50 percent, with cattle marketings off 38 percent; and renderers are having difficulty selling animal protein for any feed use.

BSE is one example of the type of public health concern that agriculture may find difficult to deal with because there is a perceived risk beyond consumer control, and long-term effects are unknown.--*M.F. Hutjens, Extension Dairy Specialist*

Summary of Top Dairy Herds in Illinois

Several months ago, dairy specialists in Wisconsin summarized the feeding practices of top Dairy Herd Improvement (DHI) herds in that state. Although varied, the results were informative; and the parallel question arose regarding practices of top producers in Illinois.

In late spring, then, contact was established with Illinois producers of five of the top Holstein herds and one each of Ayr, Jersey, Brown, and Guernsey breeds. The results are summarized in tables 1 and 2.

Table 1. Production Data Summarized for Nine Top DHI Herds in Illinois, 1989

Breed	Holstein	Ayr	Jersey	Holstein	Brown	Holstein	Holstein	Holstein	Guernsey
Cows, number	77	37	87	20	63	60	59[a]	47	115
Milk, pounds	22,508	15,443	17,222	22,711	17,305	23,477	22,177	21,317	15,376
Fat, percent	3.5	4.1	4.5	3.5	4.2	3.6	3.7	3.7	4.4
Protein, percent	3.1	3.4	3.5	3.1	3.6	3.2	3.1	3.1	3.4
Protein/fat ratio	0.89	0.83	0.78	0.89	0.86	0.89	0.84	0.84	0.77
					-pounds-				
Dry matter, total	42.0	42.0	34.3	52.9	47.5	41.0	58.0	52.0	46.0
Forage dry matter	20.3	22.0	14.3	26.6	16.9	14.6	25.0	28.0	22.0
Grain dry matter	21.7	20.0	20.0	26.3	30.6	27.4	33.0	24.0	24.0
Milk yield balanced for in the ration 85	na	na	90	80	na	95	90	70	

[a] Milked three times a day

Table 2. Forage Data on 100 percent Dry Matter Basis

	Holstein	Ayr	Jersey	Holstein	Brown	Holstein	Holstein	Holstein	Guernsey
Hay	12.3[a]	9	1.7	14.6	3.2	6	12.9	10	4
Corn silage	8.0	4	4.9	8.0	4.7	4.8	5.3	18	0
Haylage	0	9	7.7	4.0	9.0	9.2	6.8	0	18

[a]Includes 1.8 pounds of grass hay

Compared to Wisconsin's summary (see *Illinois Dairy Digest*, Vol. 19 No. 2), several Illinois items differ:

- Herd sizes were smaller in Illinois, ranging from 20 to 115 cows.
- Top Wisconsin herds averaged approximately 4,000 pounds higher milk yield than leading Illinois herds. However, only one Illinois herd was milked three times a day. If Illinois production values were converted from a two to three times a day milking basis, milk yield would rise approximately 15 percent, an increase similar to that of the Wisconsin yield.
- In terms of milk protein to milk fat test ratios, the top herds in Illinois were more similar to average herds than Wisconsin herds were. This difference, higher protein in the Illinois herd, can be related to the lower levels of fat being fed.
- In Illinois, corn silage was fed in more herds and at higher levels, while haylage was less important than in Wisconsin herds.

Several other interesting feeding practices are summarized here:

- Dry shelled corn was the primary grain energy source for seven farms. The other energy sources reported were dry ear corn for two farms, high-moisture shelled corn for two farms, and oats for two farms.
- Commercial protein supplements were used on five farms, by-product feeds on three farms, and soybean meal on three farms.
- Cottonseed was fed on seven farms, ranging from 1.1 to 6.5 pounds, extruded soybeans on four farms, ranging from 1.8 to 2.7 pounds, and protected fat on four farms, ranging from 0.2 to 0.5 pounds.
- Micronutrients fed included commercial mineral mixtures, seven farms; niacin, seven farms; limestone, six farms; zinc methionine, four farms; and yeast, four farms.
- A Total Mixed Ration (TMR) was fed on two farms, while an electronic grain feeder was used on one farm.

Seven farms used commercial feeds and company ration assistance, two used consultants, and Extension service personnel were involved on three farms.

Overall, top Illinois producers each had unique ways to feed their high-producing cows. No one way is correct; their success can be measured by the results.--*M.F. Hutjens, Extension Dairy Specialist*

Costs to Produce Milk

Higher milk prices caused total returns to exceed total economic costs for Illinois dairy producers in 1989, according to figures summarized by University of Illinois agricultural economists in cooperation with the Illinois Farm Business Farm Management Association (FBFM). Individual records tabulated were from farmers enrolled in the FBFM record-keeping and business analysis program. The average net price received per 100 pounds of milk was $13.10, compared to total costs of $12.77. Per cow, total returns from milk were $2,160, compared to $2,105 in total costs to produce milk.

A detailed breakdown by herd size of 1989 milk production costs and returns for dairy farms is shown in Table 3. Farms included had no other livestock, with all costs accounted for either in crops or in the dairy enterprise. Total costs for the dairy enterprise were reduced by income from sales of dairy animals or from an inventory increase in pounds of beef produced during the year. The value of the added pounds was figured at the average price received for all weights of dairy animals sold in the past five years. The residual costs—87 percent of the total enterprise costs—were the net cost of producing milk. The feed cost includes on-the-farm grains evaluated at average Illinois market prices for the year, with corn at $2.48 per bushel and oats at $1.88. Commercial feeds were listed at actual cost, hay and silage at farm values, and pasture at 40 cents per animal per pasture day.

Milk production per cow for all herds averaged 16,496 pounds. The average was 212 pounds more per cow than in 1988, and 2,013 pounds or 14 percent more than in 1984. Herds with more than 80 cows produced milk more cheaply than herds with 40 to 80 animals. Total costs for each 100 pounds of milk produced were 69 cents lower for the larger herds. Labor costs were 28 cents less per 100 pounds produced, and feed costs were 18 cents less for the larger herds. The trend in total costs and returns per cow for all herds is given from 1986 to 1989 (Table 4) and from 1980 to 1989 (Figure 1). When cash and noncash costs are figured, the profit margin (return above all cost) increased sharply—from $-71 in 1988 to $55 per cow in 1989. This year is only the second in the 1980s that total returns exceeded total economic costs. For Figure 1, labor, depreciation, and interest charges are included only in total costs. Most dairy producers incur some expense for hired labor and cash interest, categories that are included as cash operating costs.

Higher prices received for milk were the major reason that total returns exceeded total costs in 1989. The average net price received for milk was $13.10 per 100 pounds. This price is $1.18 per 100 pounds or 10 percent higher than the average received in 1988. Based on 16,500 pounds of milk produced per cow, this increase in price added $195 to total returns per cow. The average net price received for milk in 1989 was the highest since 1981.

Table 3. Costs and Returns for Illinois Dairy Enterprises, by Herd Size, 1989

	Herds with 40 to 80 cows each	Herds with more than 80 cows each	All units
Number of farms	101	53	154
Average tillable acres per farm	269	474	340
Average number of cows per farm	58.3	110.7	76.3
Average milk per cow, pounds	16,488	16,512	16,496
Average beef produced per cow, pounds	590	610	597
Costs per cow, milk plus beef	$ 2,438	$ 2,346	$ 2,406
Average returns from beef per cow	295	313	301
Net costs for milk per cow	2,143	2,033	2,105
Return from milk per cow	2,158	2,165	2,160
Return above all cost	15	132	55
Cash costs per 100 pounds of milk produced			
Feed	$ 6.28	$ 6.10	$ 6.22
Operating expenses, maintenance and power	$ 1.36[a]	$ 1.30[a]	$ 1.34[a]
Livestock expense	1.04	.95	1.01
Insurance, taxes, and overhead	0.26	0.22	0.25
Total operating expenses	$ 2.66	$ 2.47	$ 2.60
Other costs per 100 pounds of milk produced			
Depreciation	$ 0.77[b]	$ 0.76[b]	$ 0.77[b]
Labor	1.77	1.49	1.67
Interest charge on all capital	1.52	1.49	1.51
Total other costs	$ 4.06	$ 3.74	$ 3.95
Per 100 pounds of milk produced,			
Nonfeed costs	$ 6.72	$ 6.21	$ 6.55
Total costs	13.00	12.31	12.77
Net price received	13.09	13.11	13.10
Return above all costs	0.09	0.80	0.33

[a]Includes utilities, machinery, repairs of equipment and buildings, machines hired, and fuel.
[b]Includes machinery, equipment, and building depreciation.

Table 4. Costs and Returns per Cow for Illinois Dairy Enterprises, 1986 to 1989

	1986	1987	1988	1989
Number of farms	180	163	157	154
Number of cows per farm	73	79	75	76
Net cost for milk, per cow	$ 1,890	$ 1,863	$ 2,012	$ 2,105
Return from milk, per cow	$ 1,833	$ 1,930	$ 1,941	$ 2,160
Return above all costs, per cow	$ -57.00	$ 67.00	$ - 71.00	$ 55.00
Price received per 100 pounds of milk	$ 11.80	$ 12.16	$ 11.92	$ 13.10
Price received per 100 pounds of beef	$ 43.21	$ 51.16	$ 56.44	$ 57.35
Milk produced per cow, pounds	15,541	15,863	16,284	16,496

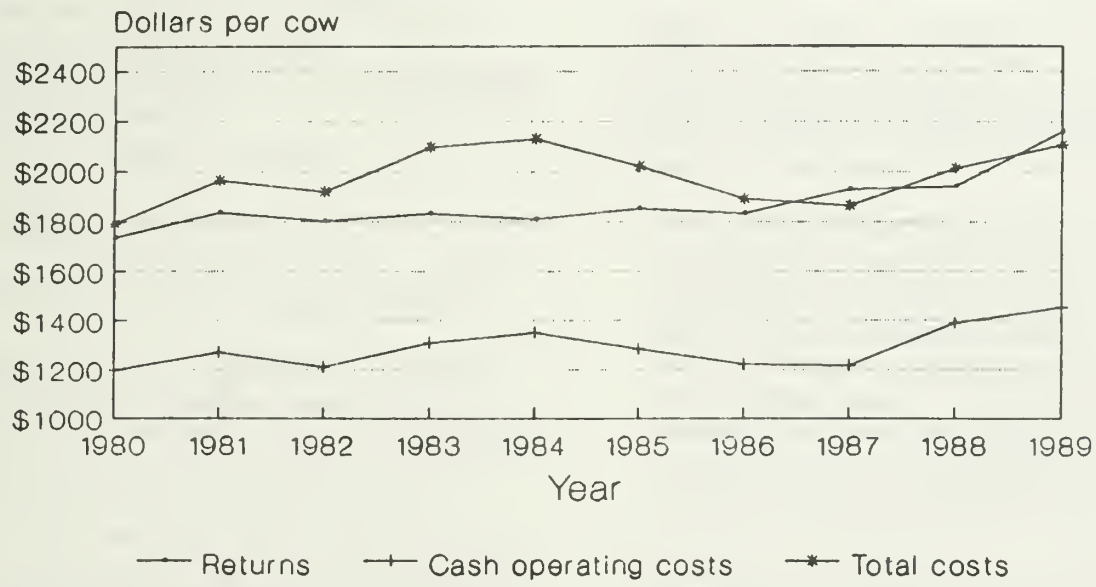


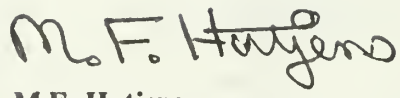
Figure 1. Returns and costs to produce milk, 1980 to 1989. Interest, depreciation, and labor charges included only in total costs.

Not only did the price received per 100 pounds of milk increase, but feed and nonfeed costs per 100 pounds of milk produced also rose. Feed costs in 1989 averaged $6.22 per 100 pounds of milk produced, as compared to $6.05 in 1988. At their highest level since 1984, feed costs accounted for 49 percent of the total cost to produce milk. In decline from 1984 to 1988, nonfeed costs per 100 pounds of milk produced increased from $6.31 in 1988 to $6.55 in 1989. Higher interest charges were the main reason for the increase in nonfeed costs.

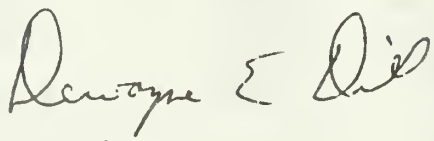
Along with producing milk, dairy enterprises also produce beef. The average amount of beef produced per cow in 1989 was 597 pounds. The average price received per 100 pounds sold was $57.35, the highest since 1979. Dairy enterprises have benefited from the relatively good beef prices that producers have received during the last two years.

Profit margins for dairy producers in 1990 will depend to a great extent on continued strong milk prices. The average price received for milk in 1989 was 10 percent higher than in 1988. The average milk price for the first 6 months of 1990 was 11 percent higher than it was for the same period in 1989. Future milk prices will depend on basic supply and demand.

While 1990 milk prices have remained strong, feed costs should decline in 1990 due to lower hay prices. Improved weather conditions have increased hay production. Feed costs per 100 pounds of milk produced would average about $5.90 using prices of $2.50 per bushel for corn, $0.15 a pound for protein, and $65 a ton for hay. These costs are based on annual feed consumption per cow (including replacement animals) of 119 bushels of corn, 2,275 pounds of protein, and 7.3 tons of hay or hay equivalents. If nonfeed costs to produce 100 pounds of milk average $6.60, total costs will average $12.50. If milk prices remain relatively strong during the second half of 1990, total returns should exceed total costs per 100 pounds of milk produced for the second year in a row.--
D.H. Latz, Extension Farm Management Specialist



M.F. Hutjens
Extension Dairy Specialist



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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Vol. 19 No. 4 December 1990

IN THIS ISSUE

Attend the 1991 Illinois Dairy Days Conference

This year's Illinois Dairy Days conference, "Making It Happen in 1991," will help managers make the sound economic decisions that can offset a decline in milk prices. Topics include dry cow management, computer applications, and manure management considerations. Day meetings start at 10:30 a.m., with registration at 10:15. A registration fee of $4 per farm plus lunch charges will be collected. Dates and locations are listed below. Times for evening sessings (in Yorkville and Jerseyville) are also listed:

Jan. 7 El Paso, Elms Restaurant
Jan. 8 Dixon, Brandywine Inn
Jan. 9 Elizabeth, Community Building
Jan. 10 Marengo, Dino Steak House (formerly Cloven Hoof)
Jan. 10 Yorkville, Extension Office, 8 p.m. only
Jan. 11 Kankakee, Redwood Inn
Jan. 15 Quincy, Farm Bureau Building
Jan. 15 Jerseyville, Extension Office, 7 p.m. only
Jan. 16 St. Libory, American Legion Hall
Jan. 17 Breese, American Legion Hall
Jan. 18 Teutopolis, Knights of Columbus Hall

Commercial exhibits will be on display at Dixon, Elizabeth, Quincy, St. Libory, Breese, and Teutopolis. The 1991 *Illinois Dairy Report* will be available. Plan to attend and capitalize on the latest dairy research results and extension recommendations. -- *M. F. Hutjens, Extension Dairy Specialist*

Finding Hidden Production Dollars

Although milk prices received by dairy managers continue to decline (nearly $3 per hundred weight since July), lost milk income can be recouped and profitability maintained with a careful review of current feeding programs and strategies. A dozen points are listed for your consideration:

1. Do not make short term savings that would lead to larger losses in the future. Cutting back on supplemental fat or commercial mineral sources, for example, might save on purchased feeds now but result in thin cows and a poor conception rate later. The results of this decision would be longer lactations and less milk because cows would not freshen annually. This loss is estimated to be $3 per day for every day that the calving interval exceeds 400 days.

2. Calculate your feed cost per hundred weight of milk produced. If your costs are high (compare with Table 1), determine whether forage, grain, protein, mineral, or additive costs are responsible for the increase.

Table 1. Possible Feed Costs for a Group of Holstein Cows Averaging 60 Pounds of Milk

	Amount (lb DM)	Average	"High"
Forage	25	1.25	1.50
Grain	20	1.00	1.20
Protein	2	.30	.60
Min-Vit	.5	.22	.50
Additives	.3	.06	.20
Feed cost/day		$2.83	$4.00
Feed cost/100 lb milk		$4.71	$6.67

3. Do not underfeed good cows; they will give you the highest income over feed costs.

4. Soybeans are a better buy than whole cotton as an oil seed source of energy and nutrients. Using a mixture of soybeans and whole cottonseed rather than using all cottonseed can save money.

5. If your cows are losing body weight, they need more energy. Use forages and concentrates to increase dry matter intake. Be sure to add supplemental fat; although it is expensive, the economic benefits from added fat will be 2 to 3 times greater than the costs.

6. Forage testing is a necessity. Fiber levels are high in first crop alfalfa-grass forages this year, and high fiber levels limit feed intake and lower digestibility. High ADF (acid detergent fiber) forages can be diluted with corn silage.

7. All rations, for lactating cows, dry cows, and heifers, must be reformulated and balanced to insure optimal performance with minimal feed costs. Do not overfeed or underfeed any group of dairy cattle. Be sure your animals need the nutrients the feeds provide.

8. Look for good feed buys. Forages, corn, and soybean meal are relatively good buys this year. Also, oats, soybeans, corn gluten feed, meat and bone meal, and corn distillers grain are currently priced right if bought in large quantities.

9. Feed additives can add 10 to 50 cents to feed costs per cow per day. Be sure there is an economic return above the cost of the particular feed additive. Additives should be fed only to cows that will respond.

10. All heifers should receive an ionophore (monensin or lasalocid) to improve feed efficiency and growth. Protein levels in the ration dry matter must average 16, 14, and 12 percent for heifers from 3 to 6 months, 6 to 12 months, and over 12 months of age, respectively. Heifers should calve at 24 to 25 months of age.

11. Undegraded protein or by-pass protein supplements should be fed to cows producing milk in excess of five percent of their body weight (thumb rule guideline). For example, supplements would be required for:
    - mature Holstein cows (1,500 pounds) producing over 75 pounds of milk
    - young Holstein cows (1,200 pounds) producing over 60 pounds of milk
    - Jersey cows (1,000 pounds) producing over 50 pounds of milk.

12. Dry cows must receive a specific trace mineral and vitamin program. If dry cows are shortchanged, you can expect to produce 1,000 to 1,500 pounds less milk in the next lactation.

These 12 points will enable you to find hidden dollars and remain competitive in 1990. -- *M.F. Hutjens, Extension Dairy Specialist*

DHI Herd Summary Reveals Important Differences Between High and Low Producing Herds

The DHI Herd Summary (DHIA-202) is an important tool for identifying hidden dollars in a dairy operation. When the averages of Illinois Holstein herds with a rolling 365 day average milk (RHA) under 16,500 pounds are compared with those of Illinois Holstein herds with an RHA over 19,000 pounds (see Table 2), differences are revealed that can provide opportunities for increased profitability.

The production parameters restate the difference in production between the two groups, while the other parameters illustrate why the production differences exist. Average summit milk is one of the best indicators of future rolling herd average. A thumb rule is that for every 1 pound increase in summit milk, total lactation yield increases 200 to 225 pounds. The average summit milk and average daily milk are, as expected, higher for herds with an RHA over 19,000 pounds. The genetics parameters indicate the herd sire PTA milk for lactating cows and replacements. The lower producing herds are milking cows with a lower genetic potential than the higher producing herds. However, the difference between the herd sire PTA for replacements is not as great. This indicates that the lower producing herds are not keeping their best cows but presumably are forced to cull the genetically superior animals.

A significant difference between the two groups is management of replacements. The higher producing herds begin breeding their replacement heifers 2 months earlier than the lower producing herds and freshen their heifers 1 month earlier. A thumb rule is that heifer rearing costs increase $30 per month for each month over 24 months of age at freshening. The high producing herds also have 8 percent more heifers per lactating animal from which to select future replacements. The opportunity to keep only the best heifers and to merchandise the remaining heifers is an important strategy for maximizing genetic progress as well as supplementing income.

The low producing herds also do a poorer job at reproductive management. They have average days open five days longer than high producing herds. This cost also appears in the average days dry and in the percent of

Table 2. Comparison of DHI Herd Summary (DHIA-202) Parameters for Illinois Holstein Herds with a Rolling Herd Average (RHA) under 16,500 Pounds and Illinois Holstein Herds with an RHA over 19,000 Pounds

Parameter	RHA < 16,500	RHA > 19,000
Production		
Rolling herd average, lbs.	15,708	20,215
Average summit milk, lbs.	67.0	81.9
Average daily milk, lbs.	48.0	60.2
Genetics		
Herd sire PTA milk, lactating cows	614	775
Herd sire PTA milk, replacements	1070	1126
Replacements		
Average age, replacements	1-04	1-03
Average age at freshening	2-04	2-03
Replacement to producing female ratio	93:100	101:100
Age at first breeding	1-06	1-04
Reproduction		
Average days dry	66	62
Percent dry > 70 days	32	22
Average days open, pregnant cows	132	127
Milk quality		
Average SCC	407	304
Average percent above 400,000 SCC	25	18
Average SCC milk loss per lactation	800	600

animals dry over 70 days. It costs $3 per cow per day for each day over 60 days dry.

A final management area is milk quality. Again, the low producing herds have a higher average somatic cell count (SCC), thus a greater SCC milk loss per lactation. However, the true loss due to a high SCC must also include lost plant premiums for quality milk. With lower milk prices, it is important to manage for maximum efficiency. Improving reproductive and milking management can pay sizeable dividends in increased production and profitability. -- *D.E. Dill, Extension Dairy Specialist*

1991 Illinois Livestock Management Conference Highlights the Best Use of Livestock Waste as Fertilizer

Since continued increases in oil prices directly affect fertilizer prices, the 1991 Illinois Livestock Management Conference aims to help producers cut costs by making better use of animal wastes as fertilizer. The conference will also focus on proposed amendments to Illinois Livestock Waste Regulations. Among the proposed amendments is one restricting the application of livestock waste within one-quarter mile of a populated area or an inhabited residence. A.G. Taylor, an agricultural advisor with the Illinois Environmental Protection Agency, will be on hand to discuss these changes. Other topics on the agenda include:

- "Reasons That Livestock Waste Facilities Fail"
  Brad Ruckman, the Illinois Environmental Protection Agency
- "What You Want to Know about Lagoons"
  Lawson "Mac" Safley, Department of Bio and Agricultural Engineering, North Carolina State University
- "Ways to Use the Nutrients from Animal-Waste Sources of fertilizer"
  Alan Sutton, Department of Animal Sciences, Purdue University
- "Using Wetlands for Waste Disposal"
  Lon Strong, Soil Conservation Service, Jackson, Mississippi

- "The Evolution Rates of Gases from Liquid Manure Pits"
  Ruihong Zhang and D.L. Day, Department of Agricultural Engineering, University of Illinois
- "Waste Management ideas from Europe"
  Art Muehling, Cooperative Extension Service, University of Illinois.

The conference will be held on March 19, from 8:30 a.m. to 3:45 p.m. at the Chancellor Hotel Convention Center, 1501 S. Neil St., Champaign. A $35 registration fee includes lunch, coffee, rolls, and a printed copy of proceedings of all papers delivered at the conference. To register for the program or obtain more information, contact Art Muehling, Department of Agricultural Engineering, University of Illinois, 332E Agricultural Engineering Sciences Building, 1304 W. Pennsylvania Ave., Urbana, IL 61801, (217)333-9313, FAX (217)244-0323. -- *A. Muehling, Extension Swine Specialist*

Extramural Courses Offered

Two extramural dairy science courses will be offered this spring for interested producers, educators, and agri-business personnel. Both courses will meet Wednesday nights for 10 weeks beginning January 23, from 6:30 p.m. to 9:45 p.m. Each course will provide 2 hours or 1/2 unit of credit. The cost is $140, plus a $30 support fee.

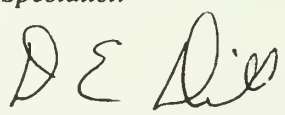
"Genetics and Animal Improvement: Emphasis on Dairy Cattle" will be taught by Professor Roger Shanks at Greenville. The course includes a discussion of the basics of genetic evaluation, selection response, animal model, and dairy breeding strategies. Computer programs for simulation of selection methods in a dairy herd and sire selection will be presented.

"Dairy Feeding and Management for the 1990s" will be team taught by Professors Mike Hutjens and Ed Jaster at Freeport. The course includes a discussion of dairy feeding principles and nutrients: dry cow, milk cow, and heifer programs; BST; three-time-a-day milking; and management strategies. A farm study and computer lab will be included.

To register, contact Mr. William Sutton (618/398-7989) for the genetics course, or Ms. Robbin Nelson (815/395-5592) for the feeding course. Register early; enrollment is limited. -- *M. F. Hutjens, Extension Dairy Specialist*

Dairy Lab Services Hires New Manager

Dairy Lab Services, Inc., which contacts management service to DHI of Illinois, has hired Dr. Robert Damm as its general manager beginning December 15. Dr. Damm dairy farmed in Wisconsin for 14 years and was director and president of 21st Century Genetics. In 1986 he worked for Pennsylvania DHIA, then moved back to Wisconsin in 1988 to manage the Central Wisconsin DHI association and milk laboratory. -- *D.E. Dill, Extension Dairy Specialist.*



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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Vol. 20 No. 1 March 1991

IN THIS ISSUE:

Is End-Product Pricing Equitable?

The current hundredweight method of pricing milk encourages production of milkfat. Yet the consumption of high fat products, such as whole milk, ice cream, butter, and high fat cheese, is declining. This trend in part has precipitated the recent interest in an alternative mechanism for determining the price that producers receive for raw milk.

Numerous solutions have been proposed to rectify the inequities in the present pricing system. Although most of these attempts fall under the label of component pricing, they do not adequately define the requirements of a true component-pricing scheme. A payment plan that prices milk on a basis other than volume alone is not necessarily component based. Fat differentials, protein differentials, and quality or yield premiums are merely competitive procurement devices unless they are tied strictly to the true value derived from that component. Any new payment plan, regardless of the label attached, must pay the producer equitably and charge the processor for every fraction of raw milk that has value.

The manufacture of a standardized cheese such as mozzarella will be used to explain this point. Yield of cheese is determined by the percent of protein that is casein, the percent casein and fat retained in the cheese, the mineral/salt retention factor, and the moisture of the cheese. In the case of standardized cheeses, the casein-to-fat ratio is also critical.

To standardize milk to a certain casein-to-fat ratio, the following standardization methods are used: 1) removal of cream, 2) addition of nonfat dry milk, 3) both removal of cream and addition of nonfat dry milk, 4) addition of condensed skim milk, and 5) addition of skim milk.

The amount a processor pays for raw milk should depend on both the standardization method used and the value of sweet cream or the cost of nonfat dry, condensed skim, or skim milk. Table 1 lists relative values for three standardization methods. This table also includes the value of raw milk if used to manufacture cheddar cheese, a non-standardized cheese. As table 1 illustrates, a payment plan based on components alone would not compensate the producer equitably for the true value derived from the raw milk. Instead, the type of product manufactured and the method of manufacture also determine the value of the raw product.

Requiring processors to pay the full true value of raw milk less their operating costs would remove any economic incentive for the processor to use different standardization methods. However, a pricing plan that does not recognize and compensate for the variation in milk value, depending on the end product and method of manufacturing, is not equitable and does not compensate the producer fairly for the true value of raw milk. -- *D.E. Dill, Extension Dairy Specialist*

Table 1. Relative Value of Raw Milk in Dollars, with Percent Varying Fat and Protein Content, and Various Standardization Methods Used in Making Mozzarella and Cheddar Cheeses

----Raw milk----		----Mozzarella cheese----			----Cheddar cheese----
Fat	Protein	Cream removal	Nonfat dry milk addition	Cream removal and nonfat dry milk addition	Non-standardized
3.5%	3.1%	$15.12	$13.75	$15.18	$13.08
3.5	3.4	16.25	14.26	16.31	13.61
4.0	3.3	16.40	15.31	16.46	14.51
4.0	3.7	17.91	15.98	17.97	15.23
4.5	3.8	18.80	17.37	18.87	16.49
4.5	4.0	19.57	17.70	19.63	16.83

End-Product Pricing Impacts Non-Holstein Breeds

If milk were priced on the value of the cheddar cheese produced, how would that change the milk price received by an individual dairy operation? The top Illinois herd for each of the five major breeds enrolled in the Dairy Herd Improvement program was analyzed to determine how milk price would change.

Prices used for this comparison were:

base milk price	$10.19 per hundredweight
fat differential	$ 0.12 per percentage point
cheddar cheese price	$ 1.1271 per pound

As can be seen from table 2, all herds would benefit from a higher milk price. The hundred weight basis price ranges $10.31 to $11.63 per hundredweight. The end-product basis price ranges from $13.51 to $17.06. When expressed on a total per year per cow, the total value per cow ranged from $1,757 to $2,674 for the hundredweight basis and from $2,453 to $3,504 for the end-product basis.

The Jersey herd would benefit the most from the end-product basis—$890 per cow per year. As a percent of the hundredweight price, the Guernsey and Jersey herds would benefit nearly the same by an end product basis (44.2 and 46.7 percent respectively). -- *D.E. Dill, Extension Dairy Specialist*

Table 2. Comparison of End-Product and Hundredweight Basis of Pricing Milk on Total Milk Value for Top Herd in Each Breed Enrolled in Illinois Dairy Herd Improvement Program

	Ayrshire	Brown Swiss	Guernsey	Holstein	Jersey
365-day Rolling Herd Average					
Milk	15,929	19,609	15,884	25,934	16,510
Fat	4.2	3.6	4.5	3.6	4.7
Protein	3.3	3.5	3.5	3.0	3.6
Price (dollars per hundredweight)					
Hundredweight basis	11.03	10.31	11.39	10.31	11.63
End-product basis	15.40	14.42	16.43	13.51	17.06
Total value per cow per year (dollars)					
Hundredweight basis	1,757	2,022	1,809	2,674	1,920
End-product basis	2,453	2,828	2,610	3,504	2,817
End-product (hundredweight basis difference)					
Dollars	696	806	801	830	897
Percent	39.6	39.9	44.2	31.0	46.7

Feeding a Top Illinois Herd

Gates' Wild Pure Farm in Stockton had a tremendous year in 1990, ending with an average of 25,934 pounds of milk, 935 pounds of fat (3.61 percent), and 790 pounds of protein (3.05 percent). Bob and Judy Gates manage the herd of 60 cows, which were milked three times a day. The feeding program is summarized below:

Feed	Pounds
1. Total mixed ration	
Alfalfa haylage (45% DM, 18% protein)	50.0
High moisture shelled corn (75% DM)	20.0
Corn gluten feed	6.0
Whole cottonseed	3.0
Roasted soybeans	3.0
Meat and bone meal	2.2
Tallow	1.0
Commercial premix (buffer and trace)	0.8
Limestone	0.2
Zinc methionine and yeast	0.1
2. Dry hay	8.0
3. Topdress	
Expeller heat-treated soybean meal	4.0
Soyhulls	2.0
Protected fat	0.2
Limestone	0.2
Commercial premix (buffer and trace)	0.1

The cows consumed 100.7 pounds of wet feed or 65 pounds of dry matter (4.65 percent of body weight). The ration contained 64 percent dry matter, 19.7 percent crude protein, 20.5 percent acid detergent fiber, 0.78 megacalories per pound of dry matter, 1.13 percent calcium, and 0.52 percent phosphorus. Milk protein was slightly depressed at 3.05 percent (it should be 3.2 percent), probably due to fat feeding. Additives included were niacin, buffer, yeast, and zinc methionine. Bypass protein and protected fat sources were fed along with oilseeds and tallow. -- *M.F. Hutjens, Extension Dairy Specialist*

1991 Illinois Dairy Reports

A limited supply of the 1991 *Illinois Dairy Report* is available. Three extension and numerous research reports are included in the 62-page booklet. To order, call Rosemary Judy at 217/333-2933 or write to Dairy Extension, 315 Animal Sciences Lab., 1207 W. Gregory Drive, Urbana, IL 61801. The price is $4, plus $1 postage. -- *M.F. Hutjens, Extension Dairy Specialist*

Illinois Heifer Program Evaluation

Dairy producers will soon have an opportunity to gauge the productivity of their herds. The heifer program checkup is part of National Animal Health Monitoring System (NAHMS)'s National Dairy Heifer Evaluation Project. (NAHMNS is itself a branch of USDA's Animal and Plant Health Inspection Service [APHIS]). The program will assist producers across the United States in identifying areas of potential improvement relating to herd health within their operations.

Evaluations will be offered for milk replacer quality, heifer growth, colostrum delivery system, fecal shedding rates for common enteric agents, and blood selenium levels. The participating farmers may choose to take part in one or all areas. In addition, producers will be asked to record occurrences of health events in preweaning calves for a three-month period. At the end of three months, the results of all evaluations will be returned to them with comparisons to averages of other, anonymous area producers.

Beginning spring 1991, producers from twenty-eight states, including Illinois, will be contacted regarding participation. For more information, contact Kevin L. Petersburg, Acting Area Veterinarian-in-Charge, USDA, APHIS, Veterinary Services, 614 E. Carpenter, Springfield, IL 62702; 217/492-4104. -- *M.F. Hutjens, Extension Dairy Specialist*

Consider Newspaper As Cattle Bedding

Many communities are actively recycling newspaper, but supply can exceed demand. One excellent use of old newspaper is as cattle bedding. Used newspaper prices of $20 per ton make newspaper an attractive and economical alternative to straw. A community of 5,000 people generates enough newspaper for 2,500 head of cattle.

Newspaper bedding absorbs more moisture than sawdust, straw, or hay; decomposes faster; and costs less. Cows need 2 to 3 pounds per day; if mixed with straw, the proportions are 30 percent straw and 70 percent newspaper.

Avoid slick magazine covers since the paper can cut teats and is difficult to handle. Black ink does not seem to be a problem, and environmental mastitis pathogens (coliforms or streptococci) grow more slowly in paper than straw.

Newspaper should be chopped into strips 2 to 10 inches wide or squares of 2 to 5 inches. Chopped newspaper dissolves in lagoons or liquid systems with no settling out or crusting. Disadvantages, however, include dustiness (users should wear a filter mask), difficulty in blowing, and messiness. Additionally, chopped newspaper can be windblown around the facility.

Commercial newspaper choppers that can handle bundles of newspaper are available. Bedding choppers with knives bolted on (rather than welded), forage or bale choppers, and industrial shredders can be used. These units vary from $2,000 to $7,500.

In the Chicago area, one paper resource is Bob Getz, University of Illinois Chicago Campus at 312/996-2837. -- *M.F. Hutjens, Extension Dairy Specialist*

Table 3. DIII Scorecard for Holsteins in Illinois, November 1989

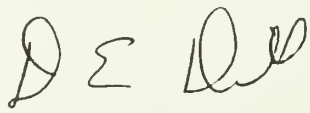
Production range in pounds of milk	<14,750	14,750 16,500	16,500 18,000	>18,000
Number of herds	168	308	279	379
Milk pounds (RHA)[a]	13,052	15,606	17,188	19,495
Fat pounds (RHA)	478	566	622	701
Protein pounds (RHA)	421	502	551	623
Percent in milk	84	86	87	88
Daily milk pounds	42.6	48.2	52.0	58.3
Average SCC[b] (linear score)	4.3	3.9	3.7	3.4
SCC (dollar loss per cow per day)	0.47	0.39	0.36	0.30
Summit all (pounds)	58.5	66.7	71.9	79.6
*First lactation summit (percent of 3rd plus lactation summit)	74.8	73.6	73.8	72.5
Dry days	68	66	65	63
Percent dry, 40 to 70 days	43	53	61	67
Days to first breeding (pregnant cows)	96	91	88	92
Days open (pregnant cows)	132	132	128	127
Age to first breeding, replacements (years-months)	1-08	1-06	1-05	1-05
I/FC/cow/year[c] (dollars)	1,015	1,341	1,502	1,747
FC/cwt of milk[d] (dollars)	5.93	5.13	5.09	4.95
Percent identified by sire	35	55	68	82
*Percent from proven sires (cows)	24.6	43.5	58.8	77.5
PD[e] dollars, first lactation	78	103	108	118
PD dollars, service sires with PD	159	168	174	180
Age of first calving (years-months)	2-04	2-04	2-03	2-03
*Percent, first lactation	28.1	30.6	33.8	35.2
*Producing females (replacement ratio)	1:0.84	1:0.94	1:1.01	1:1.03

[a]Rolling Herd Average. [b]Somatic Cell Count [c]Income over feed cost per cow per year. [d]Feed cost per hundredweight of milk. [e]Predicted difference.

1990 DHI Holstein Scorecard

Illinois Holstein herds on DHI test in 1990 were divided into four production groups as follows: less than 14,750, 14,750 to 16,500, 16,500 to 18,000, and more than 18,000 pounds of milk. Twenty-three variables that appear on the DHI-202 Herd Summary Report or that can be easily calculated (starred [*] variables) from that report were averaged for all herds within each production group (table 3).

Dairy managers, veterinarians, and agribusiness personnel can compare values for an individual herd with the scorecard values to identify problem areas or trends in the herd. Variables that increase or decrease across production groups are the most important to analyze. DHI scorecards for 1990 are available for all other breeds through the Dairy Extension office. -- *D.E. Dill, Extension Dairy Specialist*



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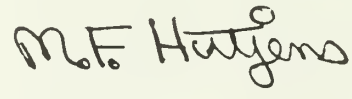
Extension Dairy Specialist



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University of Illinois at Urbana-Champaign

ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

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IN THIS ISSUE:

Can You Afford Feed Additives?

As the price of milk hovers around $10 per 100 pounds in northern Illinois and $11 in southern Illinois, reducing feed costs remains one option for dairy managers who want to maintain profit margins. Feed additives can increase feed costs from 3 to 50 cents per cow per day, or 20 percent of total feed costs (typically $2.60 to $3.00 per cow per day).

Feed additives are compounds or products that do not provide required nutrients such as protein or minerals. Rather, an effective feed additive can cause a biological change in the animal resulting in an economic response (such as maintaining a desirable rumen environment, reducing ketosis, increasing feed efficiency, or improving milk components or milk yield).

The key questions to answer in considering whether to use a feed additive are listed here:

- What response can be expected?
- Will the response occur on the farm?
- Can the producer measure the response on his or her farm?
- Is the response economical?

If the answers are positive, dairy managers should use the feed additive if it can be fed correctly (that is, to responding cows at the optimal time only as long as needed). Table 1 indicates the suggested level, cost, and current status of common dairy additives.

Table 1. Guidelines and Considerations for Dairy Feed Additives

Additive	Level	Cost	Status
Anionic salts	200g	$ .18	experimental
Aspergillus oryzae	3g	0.05	experimental
Bentonite	454-600g	0.06	evaluative
Beta carotene	200-300mg	0.30	not recommended
Buffers,			
sodium bicarbonate	110-225g	0.06	recommended
sodium sesquicarbonate	160-340g	0.05	recommended
magnesium oxide	50-90g	0.02	recommended
Choline	30g	0.10	not recommended
Ionophore	50-200mg	0.02	recommended
Isoacids	90g	0.20	not recommended
Niacin	6-12g	0.06-0.12	recommended
Probiotics	Varies	0.02-0.18	experimental
Yeast culture	10-120g	0.06	evaluative
Zinc methionine	5g	0.02	evaluative

The Status column "experimental" indicates additional research and study are warranted; "evaluative" suggests use with monitoring in specific situations; "not recommended" reflects a lack of economic response or research from which to recommend current use, and "recommended" refers to including the additive as needed. The status of these additives can change as additional research and field experiences occur.—*M.F. Hutjens, Extension Dairy Specialist*

Managing Human Resources on Dairy Farms: Job Analysis and Developing Job Descriptions

The needs of employees are often neglected on busy dairy farm operations. When was the last time you sat down with each employee to discuss job performance and satisfaction? Employees are resources just as cows, feed, and machinery are resources. But because your employees are human resources, they require different management techniques than other resources. The purpose of this series of articles is to outline various aspects of the human resource management process and to provide insight into how you can help your employees achieve personal satisfaction and maximum job performance.

To make effective decisions in selecting, promoting, training, appraising, and compensating employees, it is vital for the employer to know what employees do on a daily basis. The process of determining an employee's responsibilities is known as job analysis. Through job analysis, a job description is developed, a **written** narrative of the duties performed by each employee. This narrative includes information about equipment used and the working conditions of the job. For example, does the employee drive a tractor, use a computer, or operate a milking machine? Will he or she be working in the field, in the milking parlor, or both?

Management scientists have identified five characteristics that should be present in all jobs to effectively motivate employees. Consider these items as jobs are analyzed on your farm:

Skill variety: the degree to which a job requires a variety of activities that fully utilize the skills of the employee;

Job identity: the extent to which the job allows the employee to complete a whole task, not just bits and pieces of a very large task;

Job significance: how important the job is in relation to other employees and the functioning of the dairy farm as a whole;

Autonomy: the degree to which a job gives an employee enough freedom to determine his or her own way of performing (for example, there is more than one way to mend a fence);

Feedback: the degree to which the employee is able to learn new things from the job itself and from coworkers.

As you proceed to develop job descriptions, you should include the specific skills, knowledge, abilities, and physical or personal characteristics the job requires to satisfy these five motivational needs.

A written job description that has been carefully constructed will be of considerable benefit both in seeking to hire new employees and in evaluating present ones. You will be able to determine more precisely the type of employee needed for a particular job, and the potential employee will be better able to decide if his or her qualifications match the requirements of a given job. In so doing, you may avoid hiring employees who are over- or under-qualified for a job; and you will reduce the likelihood of an applicant's accepting a job for which he or she is not suited. If the employee/position match is good, you will not ask yourself why an employee can't perform certain tasks, or hear employees complain that their jobs are not challenging enough. Furthermore, when you appraise the performance of your employees to make promotion and salary decisions, you will be able to use the job descriptio to compare expectations and accomplishments. The employee, too, will know exactly what is expected and should not be as frustrated when you identify areas where improvement is needed.—*M.C. Musselman, Research Assistant.*

"Job Analysis and Developing Job Descriptions" is the first in a series of articles on "Managing Human Resources on Dairy Farms." Future topics include "The Hiring Process," "Employee Recruitment," "Interviewing Applicants," "Employee Selection," "Training and Development," "Employee Performance Appraisal and Compensation," "Feedback of Performance Results," and "Compensation and Benefit Plans."

Estimating UIP in Haylage

Undegraded intake protein (UIP) represents that portion of dietary protein that is not broken down in the rumen by microbes and that remains available for digestion in the small intestine. UIP is also known as bypass or escape protein. Although forage testing laboratories do not routinely provide UIP values, the data are used in computerized dairy feeding rations.

Two major factors affecting UIP values in hay crop silage are (1) forage dry matter, with drier forage having a highe percent UIP; and (2) forage quality, with higher acid detergent fiber (ADF) resulting in more UIP. For example, if high-quality alfalfa forage (22 percent crude protein with 28 percent ADF) is stored in the very wet conditions of a bunker silo, a low-UIP forage will result. Table 2 uses Dairy NRC guidelines. The user can estimate values from the table.—*M.F. Hutjens, Extension Dairy Specialist*

Table 2. Estimated UIP Values for Legume-Grass Ensiled Forages

	ADF in forage dry matter, percent			
	26	30	35	40
Forage moisture, percent	UIP, percent of total protein			
25	21	24	28	32
35	19	22	27	31
45	18	21	25	29
55	16	19	24	28
65	15	18	22	26

SMART Goals are Essential for Progress

When asked about the goals of a dairy operation, many producers today reply, "Remaining in business with $10 milk." While that might be the overall desire of the

producer, it is not a useful goal for progress or improvement. Useful goals for managing an operation, sometimes called **SMART** goals, satisfy the following criteria:

Specificity: Goals should be very specific. Specific goals help to keep you focused on the actions required to reach the goal. Remaining in business with $10 milk is such a general goal that you have no way to know whether or not you are making progress. By contrast, decreasing somatic cell counts (SCC) 150,000 cells during the next 6 months in first lactation animals is a specific and manageable goal.

Measurability: Goals must be measurable so that you can determine if progress is being made or if the goal has been reached. Specifically, a goal must be measurable for your operation. Reducing SCC might be a measurable goal for herds participating in the Dairy Herd Improvement SCC program; however, if your operation is not using that type of program, the goal might not be measurable.

Attainability: Useful goals are attainable. Look at the operation and ask if it is really possible to reach that goal. While it is good to have lofty goals that require hard work and dedication to attain, it is also important to set realistic goals or else failure and disappointment will almost certainly follow. A simple test is to evaluate the goals relative to what other similar operations are doing. Chances are good that if others have attained similar goals, you can too.

Relevance: Goals must be relevant to the specific needs of the operation. Attention should be focused on those areas of the operation requiring highest priority attention. For example, a goal could be to increase the nutrient density of the ration to support milk production of 120 pounds of milk per day. However, if the genetic potential of the herd is limiting production to 95 pounds per day, this goal is not relevant to the needs of the operation.

Timetable: A fixed timetable should be specified with any goal. Without a timetable, the goal becomes a fleeting dream. The timetable must be long enough to allow sufficient opportunity to reach the goal, yet not so long that interest is lost before the goal is reached.
If goals satisfy these five criteria, they will be useful for improving management of the dairy operation.—*D.E. Dill, Extension Dairy Specialist*

The 1990 Illinois Dairy Report Card

Agricultural Statistics Board, Dairy Herd Improvement, and Illinois Agricultural Statistics dairy figures for 1990 have recently arrived. Table 3 provides key data from the Agricultural Statistics Board.

Table 3. Illinois, Wisconsin, and United States Dairy Data, 1990

	IL	WI	U.S.
	----------thousands----------		
Milk cows	195	1,753	10,127
Change since 1989	-2	+14	+1
	----------pounds----------		
Milk yield per cow	14,462	13,919	14,642
Change since 1989	+536	+118	+396
	----------billion pounds----------		
Total milk yield	2.82	24.4	148.3
Change since 1989	+.09	+.40	+4.0
	----------percent----------		
Percent of 1989 milk	103	102	103

Compared to the national and Wisconsin data, Illinois had a good year, with an increase in milk yield per cow. Milk yield per cow is a critical measure, as it is a key indication of profitability and survivability. Unfortunately, Illinois lags behind the national average, but the state has narrowed this difference by nearly 1,500 pounds. Illinois dairy farmers continue to widen milk yield per cow compared to Wisconsin averages.

The 1990 Illinois official breed DHI averages are summarized below in Table 4.

Table 4. Illinois Official DHI Breed Averages for 1989 and 1990

Breed	1989			1990		
	Milk, pounds	Fat, %	Protein, %	Milk, pounds	Fat, %	Protein, %
Ayrshire	14,258	3.9	3.4	14,023	3.8	3.4
Brown Swiss	13,510	4.0	3.6	13,375	4.0	3.6
Guernsey	13,119	4.5	3.5	13,420	4.5	3.5
Holstein	17,301	3.6	3.2	17,491	3.6	3.2
Jersey	11,471	4.6	3.0	11,697	4.6	3.8

Jersey breeders had an increase of 266 pounds, the largest in milk yield per cow.

The third document is the Illinois Agricultural Statistics 1990 Annual Summary, which contains 1989 data. Cash receipts for milk and dairy products totaled $368 million, 5 percent of all Illinois cash farm income. Dairy farm numbers dropped to 4,100, down 500 in 1989. Among

Illinois counties, Stephenson had the most cows, 31,600; followed by Clinton with 19,000 and JoDaviess with 18,200 cows. Illinois ranked twelfth in cow numbers in the United States.—*M.F. Hutjens, Extension Dairy Specialist*

Keeping Up with Research

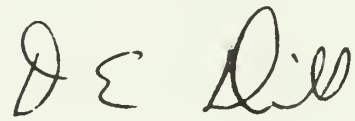
The March issue of the *Journal of Dairy Science* contains several interesting articles that will be useful for Illinois dairy producers and educators. For the articles summarized below, the author and research institution are listed for followup and questions.—*D.E. Dill, Extension Dairy Specialist*

"Correlations Among Linear Type Traits and Somatic Cell Counts." Lactation average SCC from Pennsylvania Dairy Herd Improvement Association and linear type data from the Holstein Association and Sire Power were used to estimate the genetic correlations between linear type traits and somatic cell counts. Most correlations were small and unimportant. However, genetic correlations between SCC and udder depth, SCC and fore udder attachment, and SCC and teat placement were negative or favorable. Genetic correlations between SCC and teat length tended to be positive. Perhaps longer teats are more prone to injury due to housing or handling.

Practical Application. Selection for higher, more tightly attached udders and closer teat placement should reduce or slow the increase in SCC from selection for increased milk yield.—*G. W. Rogers, Pennsylvania State University, University Park*

"Screening of Anionic Salts for Palatability, Effects on Acid-Base Status, and Urinary Calcium Excretion in Dairy Cows." Six anionic salts [$MgCl_2$ $6H_2O$, $MgSO_4$ $7H_2O$, $CaCl_2$ $2H_2O$, $CaSO_4$ $2H_2O$, NH_4CL, and $(NH_4)_2SO_4$] were evaluated for their effects on dietary dry matter intake, systemic acid-base balance, and urinary excretion of calcium. Twelve nonlacting, nonpregnant cows were used for this research. A control diet was fed during a 2-week adaptation period. Then a salt-supplemented diet was fed for one week, followed by the control diet for one week; then a different salt-supplemented diet, followed by the control diet—until all 6 anionic salts had been fed to all 12 cows. No differences in palatability or potential efficacy were detected. All 6 anionic salts had similar effects on urinary excretion of calcium.

Practical Application. Because no differences were detected, selection of anionic salts to feed during the prepartum period for prevention of parturient paresis may be based on commercial availability of the salts, price, and avoidance of toxicity. Combinations of salts are recommended because they decrease the potential for toxicity due to excessive non-protein nitrogen, SO_4, or magnesium. —*G.R. Oetzel, Colorado State University, Fort Collins*



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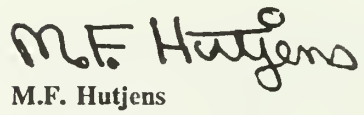

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ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Vol. 20 No. 3 October 1991

IN THIS ISSUE:

Dairy Revitalization Program Initiated

Dairy Focus 21, a program to address the erosion of the Illinois dairy industry, has been initiated this fall. During the past 10 years, the number of dairy cows has decreased by nearly 40,000 cows. While total milk production increased during the first part of that same period due to increased production per cow, in recent years total milk production has been on the decline. Illinois is a milk deficit state, producing less than 37 percent of the milk consumed. The obvious demand for milk in Illinois suggests that some other factors are constraining the industry.

The initial objective of this program is to identify the most significant constraints to profitability and industry viability. This objective will be accomplished by a survey of Illinois producers, a survey of recent producers that have quit dairying, and focus-group discussions with business organizations that provide products or services to the industry. This analysis of the industry is designed to characterize the current financial and management ability of Illinois dairy producers, to assess the managerial and financial constraints on preventing producers from competing for the Illinois consumer's demand, to determine the most appropriate steps to remove these constraints, and to forecast the long-term economic potential for the Illinois dairy industry.

The second objective is to develop specific programs to help producers in the transition to more profitable milk production. These programs will depend on the results of the first phase of the project but might include forming teams of experts to assist producers with expansion or reorganization, developing training programs for hired labor, or possibly low-interest loans for dairy expansion.

The success of this project will ultimately depend on the desire of producers to cooperate in the study, recognize the validity of the results, and participate in revitalization efforts.—*D.E. Dill, Extension Dairy Specialist*

Costs to Produce Milk

Higher milk prices resulted in total returns exceeding total economic costs for the second year in a row for Illinois dairy producers in 1990. This finding was reached by University of Illinois agricultural economists cooperating with the Illinois Farm Business Farm Management Association. Individual tabulated records came from farmers enrolled in the FBFM record-keeping and business analysis program. The average net price received per 100 pounds of milk was $13.93, compared to total costs of $13.14. On a per-cow basis, total returns from milk were $2,335, compared to total production costs of $2,204 per cow. This marked the third year out of the last four that total returns exceeded total economic costs.

Table 1 shows a detailed breakdown of 1990 milk production costs and returns for dairy farms by herd size. Farms included had no other livestock, and all costs were accounted for either in crops or in the dairy enterprise. Total costs for the dairy enterprise were reduced by income from sales of dairy animals or from an inventory increase in pounds of beef produced during the year. The value of the added pounds was figured at the average price received for all weights of dairy animals sold in the past five years. The residual costs—87 percent of the total enterprise cost—were the net cost of producing milk. The feed cost includes on-the-farm grains evaluated at average Illinois market prices for the year, with corn at $2.44 per bushel and oats at $1.25. Commercial feeds were listed at actual cost, hay and silage at farm values, and pasture at 40 cents per animal per pasture day.

Milk production per cow for all herds averaged 16,764 pounds. The average was 268 pounds more per cow than

Table 1. Costs and Returns for Illinois Dairy Enterprises by Herd Size, 1990

	40 to 80 cows per herd	More than 80 cows per herd	All units
Number of farms	102	57	159
Average tillable acres per farm	295	468	357
Average number of cows per farm	57.4	108.5	75.7
Average milk per cow, pounds	16,625	17,012	16,764
Average beef produced per cow, pounds	602	629	612
Costs per cow, milk plus beef	$ 2,546	$ 2,517	$ 2,536
Average returns from beef	322	350	332
Net costs for milk per cow	2,224	2,167	2,204
Return from milk per cow	2,306	2,387	2,335
Return above all cost	$ 82	$ 220	$ 131
Cash costs per 100 pounds of milk produced:			
Feed	$ 6.38	$ 6.14	$ 6.29
Operating expenses:			
Maintenance and power	$ 1.42[a]	$ 1.51[a]	$ 1.45[a]
Livestock expense	1.11	1.11	1.11
Insurance, taxes, and overhead	.28	.23	.26
Total operating expenses	$ 2.81	$ 2.85	$ 2.82
Other costs per 100 pounds of milk produced:			
Depreciation	$ .82[b]	$ .76[b]	$ .80[b]
Labor	1.81	1.50	1.70
Interest charge on all capital	1.56	1.49	1.53
Total other costs	$ 4.19	$ 3.75	$ 4.03
Total nonfeed costs per 100 pounds of milk produced	$ 7.00	$ 6.60	$ 6.85
Total all costs per 100 pounds of milk produced	$ 13.38	$ 12.74	$ 13.14
Net price received per 100 pounds of milk produced	$ 13.87	$ 14.03	$ 13.93
Return above all costs per 100 pounds of milk produced	$ .49	$ 1.29	$ .79

[a]Includes utilities, machinery, equipment and building repairs, machines hired, and fuel.
[b]Includes machinery, equipment, and building depreciation.

1985. Herds with more than 80 cows produced milk more cheaply than herds with 40 to 80 animals. Total costs for each 100 pounds of milk produced were 64 cents lower for the larger herds. Labor costs were 31 cents less per 100 pounds produced and feed costs were 24 cents less for the larger herds. The trend in total costs and returns per cow for all herds from 1987 to 1990 is given in Table 2 and from 1981 to 1990 in Figure 1. When cash and noncash costs are figured, the profit margin (return above all cost) increased, from $55 in 1989 to $131 per cow in 1990. This is only the third year out of the last ten that total returns exceeded total economic costs. The margin by which returns exceeded total costs was also the greatest in 1990. In Figure 1, labor and interest charges are included in total costs only. Most dairy producers will incur some hired labor and cash interest expense and would include them as cash operating costs.

The major reason that total returns exceeded total costs in 1990 was higher prices received for milk. The average net price received for milk was $13.93 per 100 pounds. This is 83 cents per 100 pounds or 6 percent higher than the average price received in 1989. Based on 16,750 pounds of milk produced per cow, this increase in price added $139 to total returns per cow. The average net price received for milk in 1990 was at an all-time high.

While the price received per 100 pounds of milk increased, feed and nonfeed costs per 100 pounds of milk produced also increased. Feed costs in 1990 averaged $6.29 per 100 pounds of milk produced, compared to $6.22 in 1989. Feed costs were at their highest level since 1984 and were 48 percent of the total cost to produce milk. Nonfeed costs per 100 pounds of milk produced increased from $6.55 in 1989 to $6.85 in 1990. Higher machinery and livestock expenses were the main reasons for the increase in nonfeed costs.

Dairy enterprises also produce beef. The average amount of beef produced per cow in 1990 was 612 pounds. The average price received per 100 pounds sold was $63.33. Historically, this price was also at an all-time high. Dairy enterprises have benefited from the relatively good beef prices producers have received during the last three years.

Profit margins for dairy producers in 1991 will shrink drastically due to lower milk prices. For many producers, total costs will exceed total revenues. While the average price received for milk in 1990 was 6 percent higher than the average in 1989, the average milk price for the first six months of 1991 has been 21 percent lower than the average for the same period in 1990. This drop in milk prices has resulted in approximately $250 less gross returns per cow for the first six months of 1991, compared to the same period the year before. Continued increases in milk production and stable demand resulted in a buildup in stocks and a drastic drop in milk prices. How quickly and to what degree milk prices will recover depends to a great extent on how dairy farmers respond to lower earnings by increased culling of their herds.

While milk prices have declined, feed costs have remained stable during the first six months of 1991. However, dry weather conditions this summer increase the likelihood that feed costs will increase. Feed costs per 100 pounds of milk produced would average about $6.30 if prices of $2.50 per bushel for corn, $0.16 a pound for protein, and $70 a ton for hay are used. This is based on annual feed consumption per cow, including replacement animals, of 120 bushels of corn, 2,450 pounds of protein, and 7.5 tons of hay or hay equivalents. If nonfeed costs per 100 pounds of milk produced averaged $6.80, total costs to produce 100 pounds of milk would be $13.10. Even with some rebound in milk prices during the second half of 1991,

Table 2. Costs and Returns per Cow for Illinois Dairy Enterprises, 1987 to 1990

	1987	1988	1989	1990
Number of farms	163	157	154	159
Number of cows	79	75	76	76
Net cost for milk, per cow	$1,863	$2,012	$2,105	$2,204
Return from milk, per cow	1,930	1,941	2,160	2,335
Return above all costs, per cow	$ 67	$ - 71	$ 55	$ 131
Price received per 100 pounds of milk	$12.16	$11.92	$13.10	$13.93
Price received per 100 pounds of beef	$51.16	$56.44	$57.35	$63.33
Milk produced per cow, pounds	15,863	16,284	16,496	16,764

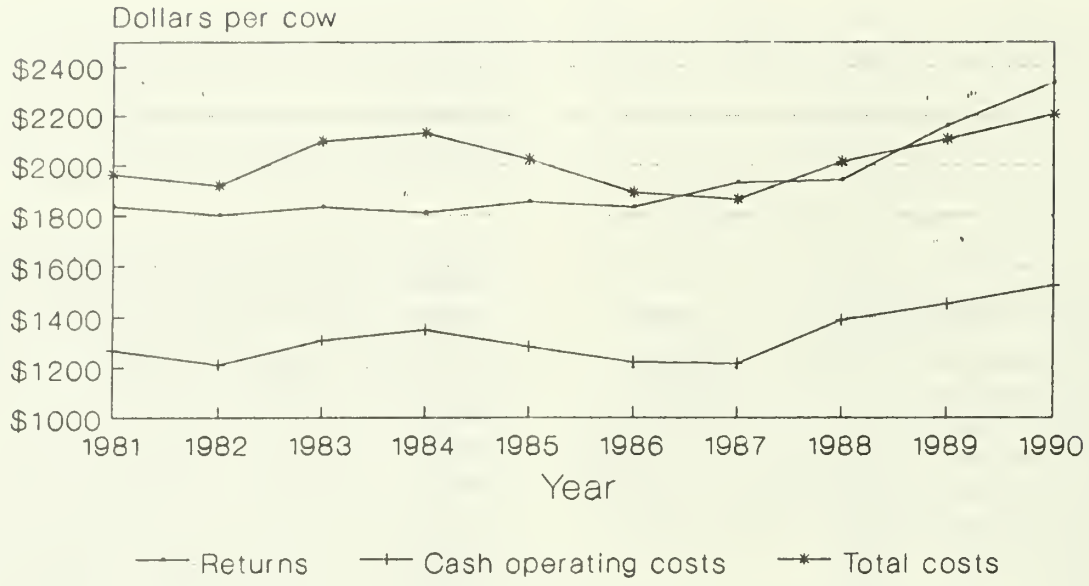


Figure 1. Returns and costs to produce milk, 1981 to 1990. Interest, depreciation, and labor charges are included only in total costs.

total economic costs will exceed total returns per 100 pounds of milk produced for most producers in 1991.—*Dale H. Lattz, Extension Specialist, Farm Management*

Milk Promotion a Poor Investment for Illinois Producers

For the past six years, Illinois dairy producers have been spending a portion of their income to support the promotional efforts of the Illinois Milk Promotion Board. The rationale for this "investment" is to increase the consumption of dairy products, thus increasing demand for them. This, in turn, was to increase the price producers receive for their milk, thus improving their economic condition. On a national scale, this might prove to be a good investment although numerous critics have questioned the benefits. However, on a local scale, milk promotion is nothing short of a bad investment.

According to USDA statistics, Illinois produced 2.8 billion pounds of milk in 1990, but Illinois consumers purchased 7.4 billion pounds of milk equivalent product during the same period. Thus, every pound of milk produced in Illinois was consumed, and an additional 2 pounds produced outside of Illinois were consumed as well. Because Illinois producers can easily market their product, their promotional dollars to expand their market are only benefiting producers from neighboring states that have a milk surplus.

It will be argued that Illinois's promotional efforts help to reduce the national surplus, thus improving milk prices for Illinois producers. Realistically, even a 10 percent increase in Illinois consumption will only increase consumption nationally by 0.002 percent. This is hardly worth the $2 million dollars invested.

Illinois checkoff money should instead be spent on addressing the cost side of milk production in Illinois. Research, education, and other programs addressing the constraints to profitable production of milk in Illinois are essential to the future viability of the industry and are a much wiser investment for Illinois producers.—*D.E. Dill, Extension Dairy Specialist*

Reviewing Your 1991-1992 Dairy Forage Alternatives

Forages provide 60 to 70 percent of dry-matter intake in a lactating cow's ration. Forages also provide 75 percent of dietary fiber and represent 30 percent of total feed costs. Illinois dairy farmers raise most of the forage that they need, but 1991 has been a challenging year. Heavy spring rains delayed planting of corn, resulting in late corn or no corn silage. Weekly rains in May, combined with the advanced maturity of the crops, resulted in low-quality, first-crop, legume-grass forages. Drought conditions caused several different types of forage situations.

- Little or no second or third cutting of legume-grass forage was made.

- Corn silage quality varied from no ears to nub ears to normal grain yields. Plant height was near normal but low in moisture.

- Legume forage made in late summer was limited in quantity but high in protein and low in fiber. Acid detergent fiber (ADF) levels were below 30 percent.

These 1991 forages must be tested and feeding programs adjusted for forage deficiencies. Drought-stressed corn silage can have 80 to 95 percent of the nutrient value of normal corn silage. Nitrate levels may be above normal and can be tested. Nitrate levels in the *total* ration should be below 4,500 parts per million or 0.45 percent on a dry-matter basis. If legume-grass forages are high in ADF, dilute the fiber with corn silage, higher quality hay, or grain. All rations should be computer analyzed and balanced, whether they are intended for milk cows, dry cows, or heifers.

Grain mixtures should be adjusted to complement the forage program. Possible strategies are outlined below.

Low-quality legume-grass forage:

- Increase the corn, barley, or wheat portion of the grain mix.
- Increase the protein level, both degradable and undegradable.
- Add fat or oil seeds to increase energy concentrate.
- Feed more pounds of the grain mix.

Drought-stressed corn silage:

- Add more pounds of grain to increase energy levels back to normal corn silage.
- Adjust the protein level with more undegradable protein.
- Consider fat or oil seeds as an energy source.

High corn-silage–based diets:

- Add digestible fiber (soy hulls, beet pulp, corn gluten feed, or wheat midds) to the grain mixture.
- Adjust protein levels with degradable and undegradable sources.
- Add a buffer to the grain mixture.
- Lower the amount of grain mix normally fed.

A properly balanced feeding program can make marginal 1991 forages profitable 1991 rations.—*M.F. Hutjens, Extension Dairy Specialist*

Recruiting Employees

Equal Employment Opportunity Legislation. Before recruiting and hiring employees, farmers need to determine if they are subject to Equal Employment Opportunity (EEO) regulations. Title 7 of the Civil Rights Act of 1964 defines who must abide by EEO legislation. According to Title 7, EEO laws apply to private employers who have 15 or more employees on each working day of 20 or more calendar weeks in a given year. Most Illinois dairy farmers are not subject to EEO regulations because they have less than 15 employees, many of whom are seasonal employees. Large farms, however, may need to take EEO into consideration as they continue to expand and increase their demands for hired labor. Even if farmers are not subject to EEO, it may still be in their best interest to avoid discrimination. Discrimination can decrease employee morale and lead to poor relations with members of the surrounding community.

Given the increasing focus of legislators and the court system on discrimination against employees, understanding how EEO defines discrimination may be helpful. EEO policies are designed to prevent discrimination against a protected class. A protected class consists of a group of persons possessing common characteristics such as race, color, religion, and sex. Two terms are important in understanding discrimination. The first is disparate treatment, which occurs when one employee is treated in a different manner than other workers because of race, sex, national origin, etc. In other words, different standards are applied to different people. The second term that applies is disparate impact, which happens when similar standards are applied to all employees but they have different consequences for certain groups. Adverse impact is nonintentional in nature.

If an employer is subject to EEO laws and is accused of violating them, he or she can defend the case in several ways. The first is to establish job relatedness. This defense is appropriate when a practice that appears neutral has disparate impact on a protected class. For example, the farm manager may be able to justify the adverse impact of requiring women to be able to lift a certain weight (for example, feed sacks) if women were unable to lift that weight and would have difficulty performing the job.

Another defense may be a bona fide seniority system (BFSS). Disparate treatment or impact resulting from a BFSS may be justified if it is not designed to discriminate. In other words, if a last-hired–first-fired policy results in a minority person being fired simply by chance, the employee has no case.

The last defense is business necessity. Actions that result in disparate impact or treatment may be justified if they

are essential to the "efficient and safe operation of the company." For example, dairy farm employees could be required to have a farm background, including a working knowledge of cattle and how to handle them. Someone with little or no experience around dairy cattle may subject himself or someone else to unnecessary injury.

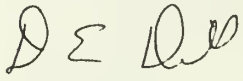
Recruitment. Recruitment involves searching for prospective employees and attracting them to apply for job openings. A dairy farm can obtain candidates either internally from among its present employees who wish to change jobs or externally from the labor market. Generally, supervisory positions would be filled internally by an employee who is familiar with the workings of the business, although a supervisor may be externally recruited if a new perspective on things is desired. External recruiting helps reduce "inbreeding" of a firm's employees, but larger salaries may be required to hire outside applicants.

There are several methods that a dairy farmer may wish to use to recruit employees. Informal methods would include: (1) asking neighbors and other farmers if they know of someone looking for employment; (2) talking with ag teachers, Extension agents, lenders, and other community members who may know of potential employees; and (3) obtaining referrals from current employees who already know about the job to be done and the type of person who is needed for the job. Also, employees can spread the word to others when vacancies occur. Informal methods are commonly used because they are quick and easy to implement and they are usually inexpensive. The other option is to use more formal methods. These include: (1) registering with a state job-service agency or a private agricultural employment agency; (2) placing advertisements in newspapers and magazines; and (3) recruiting on campus at colleges and universities.

Because many people who grew up on a farm have left agriculture to pursue other careers, there is a shortage of qualified, agriculturally competent people. The use of private employment agencies has increased recently as farmers have utilized every possible way of finding out about potential candidates. Several agencies specifically recruit agricultural employees. Typically, employers register with these agencies, specifying the type of employee they are seeking. These agencies then look for individuals who meet the qualifications of the employer. If the dairy farm hires a candidate referred by the employment agency, the farm then must pay a fee to the agency for its service. Employment agencies can be very helpful because they typically have access to a large number of potential candidates.

The most common type of formal recruiting is advertising. Advertising in a variety of magazines and newspapers allows the farmer to reach a very wide audience. According to researchers, only 10 to 20 percent of persons who read want ads are actually looking for work. Another 70 to 75 percent are happily employed, but they glance through the ads regularly to see what types of positions are available. The main purpose of a recruitment ad is to generate applications from candidates who are at least minimally qualified. Farmers should target their advertisements to Sunday newspapers as well as magazines and newspapers in the farm press.

As candidates look for jobs, they decide which jobs interest them. Their choices may be based on objective factors such as pay, location, and opportunity for advancement. One research study asked college seniors to rank the benefit features of a job in order of preference. The top four features were: (1) annual cost-of-living salary increases, (2) medical and life insurance coverage, (3) a yearly option to buy stock/ownership in the company, and (4) 3 weeks paid vacation each year. Dairy farms have typically had difficulty recruiting good employees because they have been unwilling or unable to provide benefits of this type. That situation is changing, however, as the agricultural job market becomes more competitive and dairy farms become larger. In our next issue, we will discuss interviewing applicants and selecting employees.—*Matthew Musselman, Graduate Research Assistant, Dairy Production and Management*



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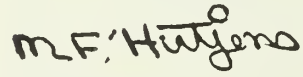

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Cooperative Extension Service
University of Illinois at Urbana-Champaign

ILLINOIS DAIRY DIGEST

FACTS FOR LAND OF LINCOLN DAIRYMEN

Vol. 20 No. 4 December 1991

IN THIS ISSUE:

Dairy Programs Offered in 1992

In the next several months numerous informational programs are being offered for dairy producers and agribusiness professionals. "Managing on the Margin in 1992" is the topic of this year's Illinois Dairy Days conference. The program is planned to provide dairy producers and agribusiness professionals who assist them practical approaches to deal with tight profit margins and roller coaster milk prices. Topics include udder health, pasture and forage systems, managing body weight of lactating cows, and economics of dairy production. Day meetings start at 10:30 a.m. with registration at 10:15. A registration fee of $4 per farm plus lunch charges will be collected. Dates and locations are listed below. Times for evening sessions (in Yorkville and Jerseyville) are also listed:

Jan. 6 El Paso, Elms Restaurant
Jan. 7 Dixon, Brandywine Inn
Jan. 8 Freeport, Highland Room, Highland Community College
Jan. 8 Elizabeth, Community Building
Jan. 9 Marengo, American Legion Hall
Jan. 9 Yorkville, Extension Office, 7:30 p.m.
Jan. 10 Kankakee, Redwood Inn
Jan. 14 Quincy, Farm Bureau Building
Jan. 14 Jerseyville, Extension Office, 7:00 p.m.
Jan. 15 St. Libory, American Legion Hall
Jan. 16 Breese, American Legion Hall
Jan. 17 Teutopolis, Knights of Columbus Hall

Commercial exhibits will be on display at Dixon, Freeport, Elizabeth, Quincy, St. Libory, Breese, and Teutopolis. The *1992 Illinois Dairy Report* will be available. Plan to attend and receive the latest dairy research results and extension recommendations.

A series of satellite video conferences (Dairy-LIVE), coproduced by the University of Wisconsin and the University of Minnesota, is also being offered to Illinois Dairy Producers. The date and topics are as follows:

Jan. 8 Managing People in the Dairy Farm Business
Jan. 29 Transferring Farm Assets and Management
Feb. 19 Managing and Housing Dry Cows and Bred Heifers
Mar. 11 Manure, Water, and Environmental Risk

All programs begin at 11:00 a.m. with a 60-minute video presentation followed by a 30-minute question-and-answer period. These programs are available for home viewing or may be offered at central downlink sites. For more information contact Dave Fischer (618)526-4551 or Stan Smith (815)288-3361.—*D.E. Dill, Extension Dairy Specialist.*

Milk and Dairy Beef Quality Assurance Program

Public attention has focused on the issue of possible chemical and drug residues in food of animal origin. The Pasteurized Milk Ordinance (PMO) establishes standards and regulations that govern grade A milk supplies. Changes in PMO approved in 1991 relate to herd health and prevention of drug residues.

Every bulk milk pick-up tanker will be screened for drug residues for lactam drugs and other suspected drugs. Once the violative producer has been identified, further pick-ups will be immediately discontinued. On the first violation, the Grade A permit will be suspended for a minimum of two days. The second violation within a twelve-month period will result in a minimum of a four-day suspension. Reinstatement of the producer's permit occurs when a

Strategies with Whole Cottonseed

Whole fuzzy cottonseed has experienced dramatic price drops this year. From $280 per ton in 1990, current prices for bulk have plunged below $100 per ton in southern Illinois. The reason is that increased acreage, large yields, and significant seed carryover from last year resulted in large supplies of cottonseed. Cottonseed is an attractive seedstuff because of its fat, fiber, and undegraded protein content. However, storage facilities must be available to keep it dry to avoid mold and aflatoxin formation.

In addition, dairy farmers should limit whole cottonseed fed to the dairy cow to 7 pounds per day, providing 1.2 to 1.5 pounds of unprotected fat. The total amount of cotton product (meal and seed) should be below 10 pounds because of gossypol, a yellow polyphenolic pigment which is harmful when fed at high levels (25 grams of free gossypol per cow per day). Toxicity symptoms include depression, labored breathing, loss of appetite, red blood cell fragility, and loss of fertility in males.

Gossypol levels in cotton products vary (whole seed, .47 to .63 percent; delinted whole seed, .47 to .53 percent; solvent extracted cottonseed meal, .1 to .5 percent; and cottonseed hulls, .06 percent). The maximum level is 18 milligrams of gossypol per pound of live animal weight or 25 grams for a 1400 pound cow (18 milligrams x 1400 pounds = 25,000 milligrams or 25 grams). Six pounds of cottonseed containing .5 percent gossypol would result in 13.6 grams (.005 x 454 grams per pound x 6 pounds) of gossypol.

The breakeven price for fuzzy cottonseed, using current corn and soybean meal prices, is $130 per ton. Illinois dairy farmers needing supplemental fat, protein, or forage should consider cottonseed. Cottonseed can replace low quality forage or hay. Milk cow rations require 21 percent neutral detergent fiber (NDF) from forage sources. Six pounds of cottonseed lowers that value to 19 percent forage NDF. The high fiber content of cottonseed should be considered when balancing rations for intake and fermentable carbohydrate.

If current lactating cow rations are high in fiber, remove some lower quality forage or consider heat-treated soybeans, which are lower in fiber. Illinois researchers are studying an extruded and pelleted fuzzy cottonseed and soybean seed product.—*M.F. Hutjens, Extension Dairy Specialist*

Managing Human Resources on Dairy Farms Interviewing and Selecting Employees

The Interview Process. After potential candidates have applied for a job, their completed job applications should be screened and the most promising candidates invited to the farm for an interview. A word of caution: there have been several incidents of so-called candidates asking for money to travel to the farm for the interview; the trusting farmer sends money and then never sees or hears from the person again. *Be very careful.* You might want to promise reimbursement rather than send money in advance.

Prior to the actual one-on-one interview, the farm manager may wish to give each candidate a verbal or written test to determine his or her dairy knowledge. For such a test to be valid, the questions must be identical for each candidate. Also, the test should be administered and scored in the same manner for each candidate. Because the test has been standardized, the results can be used to make dairy knowledge comparisons between candidates.

The most appropriate test for use by dairy farm managers is a work-sample test. This type of test is used when the applicant is expected to have specific skills that the farm manager does not wish to teach the employee on the job. Examples of such skills may include an ability to work safely with dairy cattle, knowledge of common diseases affecting baby calves, or the ability to operate a tractor with a manure loader. This work-sample test may be a written paper-and-pencil test or it may involve having the employee actually demonstrate a particular skill in the presence of the farm manager. The test does not need to cover all aspects of the job, but it should cover the important relevant skills.

Errors made during interviews. Before conducting a one-on-one interview, the interviewer should be aware of several types of errors that can be made during interviews. These include the following:

1. Similarity error: Interviewers tend to like candidates who are similar to themselves and react negatively to candidates unlike themselves;

2. Contrast error: When several candidates are interviewed successively, interviewers tend to compare each candidate to the preceding candidate rather than to an absolute standard;

3. Overweighing negative information: Interviewers may overreact to one piece of negative information because they often view their role as identifying the negative characteristics of the candidates. Interviewers are also more likely to change their initial opinions of the candidate from positive to negative than from negative to positive;

4. Race-sex-age bias: The interviewer may have perceptions that are invalid. Because most jobs on dairy farms are traditionally held by men, for

example, the interviewer may have negative perceptions about the role of women in farm jobs;

5. First impression error: Interviewers form first impressions based on a relatively small amount of knowledge gleaned from the application form or the first few moments of the interview, and this impression is often difficult to change;

6. Halo error: The interviewer's impression of one aspect of the candidate influences the ratings of other characteristics. For instance, the interviewer may perceive that the candidate is very enthusiastic, and this may cause the interviewer to rate the candidate high in other areas also (loyalty, integrity, etc.), even though they are not related;

7. Nonverbal factors: Interviewers are very sensitive to nonverbal factors such as clothing, eye contact, and animation. Such factors have been shown to have almost no influence on a person's ability to perform technical job functions (e.g., milking cows or keeping records). They are important, however, if the job involves a high level of public contact;

8. Faulty listening and memory: The interviewer may miss a large portion of what the candidate says due to poor listening habits and bad memory. It is a good idea to take notes throughout the interview to aid in review later on.

Each of the above errors can greatly influence the accuracy of a personal interview and should be avoided.

Interview format. The farm manager should use a semi-structured interview format. This format allows the interviewer to plan beforehand what types of questions to ask but also leaves enough flexibility to probe more deeply into an area of interest. The most frequently used method for gaining more detail is to ask a broad question on a particular topic, and then follow with specific questions. These specific questions may vary from candidate to candidate, but the general ones should be used for each candidate.

Questions to avoid. During the interview, certain types of questions should be avoided. These include leading questions which imply a correct answer such as "You don't wish to be a farm worker the rest of your life, do you?" Also avoid "yes or "no" questions and short-answer questions since they tend to give the impression of an interrogation. Remember that certain types of interview questions are illegal. These include questions concerning race, religion, age, or marital status. However, the candidate may be asked whether he or she has any disabilities that could interfere with job performance. This question is pertinent to farm jobs since most require a considerable amount of strenuous physical activity.

As the interview is closed, the interviewer should make no commitments. Stress to the applicant that if an offer is extended, there will be ample opportunity to discuss specific details. Set a specific date for making a decision, and be certain to inform applicants by that date whether or not a decision has been made. Job candidates do not like to be left hanging. Be certain to end the interview on a positive note, leaving a good impression. Even if not interested in the position, he or she may know of someone who is.

After the interview. Following the interview, it is a good idea to check the references provided by the candidate. Information from references may be solicited in writing, but letters tend to reveal little since the person providing the reference has substantial time to evaluate statements in the letter. Telephone conversations are the most common and are less expensive than face-to-face interviews with the reference. Asking questions such as "Would you hire the candidate back?" may give very useful information. A problem with references may be that they may fear legal repercussions if they say or write negative things about the candidate and the candidate fails to get the job.

Selecting employees. The farm manager should make every attempt to select the candidate who best fits the job description previously developed. A common temptation of employers is to change the job description to fit the employee, especially when the employee is very likable. This can be a disastrous move if the employee is not fully qualified to perform the job. Earlier in the human resource management planning process, job descriptions should have been developed which were tailored to the needs of the farm business. By changing the job description, the farm manager discards the benefits of planning. Another important item to avoid is hiring an employee who is overqualified or underqualified. Overqualified employees may soon lose interest in the job and become dissatisfied. Underqualified employees may not perform up to the expectations of the farm manager because they lack the necessary skills to fulfill their job duties. Carefully consider the personality traits of each candidate. Although these traits may not contribute to job effectiveness, it is very important for a new employee to be able to get along with and fit into the existing labor and management team. Remember, you may be able to train an employee to develop skills in areas in which he or she is deficient, but it will be virtually impossible to change the individual's personality.—*M.C. Musselman, Research Assistant*

Illinois Livestock Waste Regulation Amendments

In 1989 the Illinois EPA proposed a number of amendments to the Illinois Livestock Waste Regulations in the hope of making enforcement less difficult. The major proposed changes, concerned primarily with odor problems, dealt with the locations of new facilities and with the field application of manure. The changes as proposed would restrict new feedlots and major expansions (over 50 percent expansion within two years from what now exists) from being located closer than 1/4-mile from any nonfarm residence and 1/2-mile from a populated area (ten or more nonfarm residences).

After six public hearings held throughout Illinois in August 1990, the Illinois Pollution Control Board adopted new amendments in July 1991. The new amendments, dealing with the location of new facilities, were very close to what had been proposed, but the amendments dealing with the land application of manure had been changed considerably.

As the Illinois regulations now stand, no livestock operation, including the construction of an earthen storage and a lagoon, is yet required to have a permit or to register, regardless of size, unless there is a discharge. If, however, the Illinois EPA investigates and finds that the livestock operation has a pollution potential, the operator will most likely be asked to develop a waste management plan and submit it to the Illinois EPA for approval. If there is a fish kill and the cause is traced to a livestock facility, there will be a reimbursement charge, calculated by the Illinois Conservation Department, for the assessed value of the fish that have died.

The new amendments to the Illinois Livestock Waste Regulations are as follows:

1. After July 15, 1991, new or expanded feedlots and waste-handling facilities shall not be located within 1/2-mile of a populated area or within 1/4-mile of a nonfarm residence. Exceptions to this are when

    a. The facility is located in an Agricultural Area, designated as such by the Agricultural Areas Conservation and Protection Act;

    b. The facility undergoes expansion, and the owner certifies and notifies the EPA in writing that the facility was operating as a livestock facility or waste-handling facility for at least one year prior to the existence of any nonfarm residence within 1/4-mile, or of a populated area within 1/2-mile, of the facility;

    c. The use of the facility is allowed by local zoning or municipal ordinance. If no zoning, the facility shall be exempt if the livestock are not raised primarily for hire or for profit.

2. During field application of manure, operators shall practice odor control methods so as not to affect a neighboring farm or populated area by causing air pollution. Odor control methods include but are not limited to

    a. Soil injection and other methods of incorporation;
    b. Consideration of wind direction and other climatic conditions;
    c. Designing and operating any lagoon in accordance with standards of the American Society of Agricultural Engineers.

3. Feedlots with fewer than 300 animal units (the equivalent of 210 dairy animals, 300 beef animals, or 750 swine animals over 55 pounds) may use a vegetative filter with a feedlot runoff control system. With 50 animal units (the equivalent of 35 dairy animals, 50 beef animals, or 125 swine animals over 55 pounds) or fewer, a runoff control system is not required unless there is a discharge into the waters of the state.

From the Illinois EPA 1990 annual report, two-thirds of all complaints from livestock operations were from water pollution and one-third from bad odors. The size of the operation had little to do with the number of complaints. Swine units had by far the largest number of complaints, with beef and dairy units having about the same number. The largest number of water pollution problems observed on dairy farms were from feedlot runoff. There were very few odor complaints from dairy farms. The field application of swine manure accounted for the largest number of odor complaints.—*A.J. Muehling, Extension Agricultural Engineer*

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